

A REVISION OF THE LIZARDS  
OF THE GENUS ACANTHODACTYLUS  
(SAURIA: LACERTIDAE)

by

ALFREDO SALVADOR



BONNER ZOOLOGISCHE MONOGRAPHIEN, Nr. 16  
1982

Herausgeber:  
ZOOLOGISCHES FORSCHUNGSIINSTITUT  
UND MUSEUM ALEXANDER KOENIG  
BONN

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BONNER ZOOLOGISCHE MONOGRAPHIEN, Nr. 16, 1982

Preis 30,- DM

Schriftleitung/Editor:

H. Ulrich

Zoologisches Forschungsinstitut und Museum Alexander Koenig

Adenauerallee 150–164, 5300 Bonn, Germany

Druck: Ferd. L. Doepgen, 5010 Bergheim

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## 1. INTRODUCTION

*Acanthodactylus* is recognized by persons within the field as one of the most difficult genera of the family Lacertidae. The present state of its systematics could be described as chaotic. Seeing that these lizards are the most conspicuous and abundant in the desert and arid regions of northern Africa and southwestern Asia, it seems unusual that there are so few publications dedicated to the genus.

Several recent studies marked by mistaken identification of species have only confused the issue more. For example, in 1936 Angel reported specimens of *A. pardalis* in Syria when actually they were *A. grandis*. In 1957 Haas assigned to *A. fraseri* specimens which Leviton & Anderson (1967) described later as *A. gongrorhynchatus*. In 1961, Haas discussed a specimen of *A. scutellatus* which was actually *A. grandis*. Busack (1975) studied what he thought to be *A. pardalis* but which actually turned out to be *A. scutellatus*.

As far as this present work is concerned, I here propose a rearrangement which corrects much of the past and present confusion but yet at the same time does not overlook the possible need for future revisions.

## 2. MATERIAL

This review is based on the examination of more than 6,000 lizards belonging to the genus *Acanthodactylus*. The majority of them are preserved in alcohol while some are skeletons. I was also able to examine radiographs of more than 420 specimens. Below is a key for the abbreviations of the collections examined.

AMNH	American Museum of Natural History, New York.
ANSP	Academy of Natural Sciences, Philadelphia.
BM	British Museum of Natural History, London.
BMI	Bagdad Museum Iraq, Bagdad.
CAS	California Academy of Sciences, San Francisco.
CM	Carnegie Museum of Natural History, Pittsburgh.
EBD	Estación Biológica de Doñana, Sevilla.
FMNH	Field Museum of Natural History, Chicago.
KU	Kansas University Museum of Natural History, Lawrence.
LACM	Los Angeles County Museum of Natural History, Los Angeles.
MCZ	Museum of Comparative Zoology, Cambridge.
MNHNP	Muséum National d'Histoire Naturelle, Paris.
MVZ	Museum of Vertebrate Zoology, Berkeley.
NHMW	Naturhistorisches Museum, Wien.
TCWC	Texas Cooperative Wildlife Collection, Texas.

UCM	University of Colorado Museum of Natural History, Boulder.
UF	University of Florida, Florida State Museum, Gainesville.
UMMZ	University of Michigan Museum of Zoology, Ann Arbor.
USNM	United States National Museum, Washington.
TAU	Tel Aviv University, Tel Aviv.
ZFMK	Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn.

A catalogue number for each specimen will appear next to the abbreviation of the collection. In those instances where more than one specimen is included under the same catalogue number, the number of the specimens involved can be found in parentheses.

### 3. METHODS

My examination of specimens was aimed at studying the following characters: Size; relative proportions of head, limbs, digits, and tail; number of supraoculars. Presence of lanceolate cavity between the frontanasal and the middle of the frontal. Number of rows of granules between the supraoculars and the superciliaries. Number of superciliaries. Size of the subocular keel. Number of supralabials anterior to the subocular. Subocular contact or lack of contact with the upper lip. Pectination of the eyelids. Size of the scales on the lower eyelid. Number of supratemporals, with or without keel. Size and shape of the temporal scales and the presence or lack of keel.

Presence or absence of tympanic scale. Relative size of ear opening and the presence or lack of pectination on the anterior border. Size, shape and number of dorsals and the presence and size of their keels. Size and shape of the laterals. Size, shape, and row placement of ventrals. Size, shape, and number of scales on the anterior upper surface of the tail and the presence or lack of keels. Number of rows of scales on the fingers. Number of lamellae and carinae on the fourth toe and its lateral pectination. Number of femoral pores on each side of the body and their arrangement or not in one continuous row across the body. Variation of color pattern and coloration in young, subadults, and adults.

The osteological characters which were studied are the number of presacral vertebrae, number of cervical ribs, the number of sternal ribs, the number of non-autotomous vertebrae of the tail, and the number of vertebrae with double processes on the tail.

It was necessary to choose a region which has been well investigated and from which we have abundant material available from several different localities. Northern Egypt fulfilled these conditions since enormous collections have been gathered there by R.E. Kuntz, W.H. Wells and G.M. Malakatis on

behalf of the United States National Museum (Washington, D.C.) and by H. Hoogstraal on behalf of the Field Museum of Natural History (Chicago). For a given locality the variation of characters, as well as the different combinations of character states, was studied for the entire sample. In this manner, three different taxa corresponding to *A. boskianus*, *A. scutellatus*, and *A. pardalis* were obtained.

This same operation was followed for all the remaining localities in Egypt, the findings being consistent with the former results. As our area of investigation grew towards northwest Africa and towards southwest Asia, new taxa were added to the list. Special attention was given to the variation of character states and their different combinations in allopatry as well as in sympatry, revealing that for some cases nothing more was involved other than populations of the same species.

In addition to the already troublesome transcription of Arabic names of localities into English, other localities situated in the middle of the desert had no names at all and could only be referred to by the longitude and latitude coordinates. In an attempt to alleviate this problem, I have used the Gazetteers published in North America by the Department of Interior and thanks to them it was possible to find numerous localities and their geographic coordinates.

A Wild binocular microscope equipped with camera lucida was used to make the drawings. All have been drawn to scale with the line equal to a millimeter. I would like to thank Dr. E.N. Arnold of the British Museum of Natural History for letting me use his equipment.

#### 4. ACKNOWLEDGEMENTS

This study would not have been possible without the kind help of Dr. C.J. McCoy of the Carnegie Museum of Natural History in Pittsburgh, Pennsylvania, USA. Thanks to his efforts in my being awarded a scholarship by the Carnegie Museum of Natural History, I was able to visit the United States during the first six months of 1977. During my visit, I was able to visit some of the most important museums in the United States, and study all of the collections of the genus *Acanthodactylus*. I wish to here express my sincere gratitude to Dr. C.J. McCoy, as well as to Dr. J.L. Swauger, Head of the Visitors Program, and to Dr. C.C. Black, Museum Director.

Another important part of this study was made possible thanks to the collaboration of the British Council who awarded me a two months stay in London to study the collections in the British Museum of Natural History. My special thanks go to Dr. E.N. Arnold for all his assistance in my examination of the collections and radiographs and for the many enlightening and enormously helpful discussions we had about the problematics of the genus *Acanthodactylus*.

I would also like to gratefully acknowledge the guidance of prof. dr. F. Bernis, my doctoral advisor. Also I thank S. Mancuso for translation of the manuscript. This paper is a revised edition of a doctoral dissertation completed at Universidad Complutense, Madrid, on January 12, 1979.

I am deeply indebted to each of the following persons for their allowing me to examine the collections under their custody: Richard G. Zweifel (American Museum of Natural History, New York), Edmund Malnate (Academy of Natural Sciences, Philadelphia), E. Nicholas Arnold (British Museum of Natural History, London), Alan E. Leviton and Robert C. Drewes (California Academy of Sciences, San Francisco), C. J. McCoy and Arthur Bianculli (Carnegie Museum of Natural History, Pittsburgh), Hymen Marx (Field Museum of Natural History, Chicago), William Duellman (University of Kansas Museum of Natural History, Lawrence), John Wright and Robert Bezy (Los Angeles County Museum of Natural History, Los Angeles), Ernest Williams and Patricia Haneline (Museum of Comparative Zoology, Cambridge), Rolande Roux-Esteve (Muséum National d'Histoire Naturelle, Paris), David Wake (Museum of Vertebrate Zoology, Berkeley), James Dixon (Texas Cooperative Wildlife Collection, Texas), Paul Maslin (University of Colorado Museum of Natural History, Boulder), Walter Aufemberg (University of Florida, Florida State Museum, Gainesville), Ronald Nussbaum (University of Michigan Museum of Zoology, Ann Arbor), George Zug, Ronald Heyer and Stephen Busack (United States National Museum, Washington), José Antonio Valverde and Javier Castroviejo (Estación Biológica de Doñana, Sevilla), Franz Tiedemann (Naturhistorisches Museum, Wien), H. Mendelsohn (Tel Aviv University, Tel Aviv), Wolfgang Böhme (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn).

## 5. GENUS *ACANTHODACTYLUS* FITZINGER

*Acanthodactylus* Fitzinger in Wiegmann, 1834: 10. (Type-species by monotypy, *Lacerta boskiana*.)

*Chorodromus* Fitzinger, 1843: 20. (Type-species by monotypy, *Acanthodactylus lineo-maculatus*.)

*Psammoplanis* Fitzinger, 1843: 20. (Type-species by monotypy, *Acanthodactylus savignyi*.)

*Photophilus* Fitzinger, 1843: 20. (Type-species by monotypy, *Acanthodactylus scutellatus*.)

*Ctenodactylus* Fitzinger, 1843: 20. (Type-species by monotypy, *Acanthodactylus vulgaris*.)

*Taeneremias* Boulenger, 1921: 228. (Type-species by monotypy, *Eremias guineensis*.)

### Diagnosis

Occipital absent. Fingers with three or four series of scales. Flat ventrals. Collar present. Toes with more or less developed pectination. Femoral pores present. Parietal foramen present.

### Distribution

Northern Africa, the Iberian peninsula, the Arabian peninsula, Cyprus, Israel, Syria, Lebanon, southern Turkey, Iraq, southern Iran, Pakistan, western India, southern and northeastern Afghanistan.

## 6. KEY TO THE SPECIES

This key was drawn up to allow for the identification of the species of the genus *Acanthodactylus*. The most easily examined external characters have been used. For purposes of the key, species have been artificially grouped together. This is not meant to imply any cognate relationship.

1.	3 rows of scales on fingers .....	2
1'.	4 rows of scales on fingers .....	17
2.	1 supraocular .....	<i>A. boueti</i>
2'.	2 supraoculars .....	3
2''.	3 supraoculars .....	9
2'''.	4 supraoculars .....	13
3.	Ventrals arranged in 12 longitudinal rows .....	4
3'.	Ventrals arranged in 10 longitudinal rows .....	5
4.	Upper half of ear opening covered by skin .....	<i>A. robustus</i>
4'.	Ear opening uncovered .....	<i>A. blinci</i>
5.	Scales present between prefrontals .....	<i>A. savignyi</i>
5'.	Scales absent between prefrontals .....	6
6.	Temporal scales minute .....	<i>A. micropholis</i>
6'.	Temporal scales medium-sized .....	7
7.	Smooth scales on upperside of tail .....	<i>A. tristrami</i>
7'.	Keeled scales on upperside of tail .....	8
8.	Nostril situated among 3 nasal scales .....	<i>A. guineensis</i>
8'.	Nostril situated among 2 nasal scales .....	<i>A. erythrurus</i>
9.	Spiny scales on sides of anterior tail .....	<i>A. spinicauda</i>
9'.	No spiny scales on sides of anterior tail .....	10
10.	Dorsal scales weakly keeled .....	<i>A. maculatus</i>
10'.	Dorsal scales flat .....	11
11.	Ventrals arranged in 14 longitudinal rows .....	<i>A. bedriagai</i>
11'.	Ventrals arranged in 12 longitudinal rows .....	12
12.	Upper temporal pointed .....	<i>A. busacki</i>
12'.	Upper temporal flat .....	<i>A. pardalis</i>
13.	Dorsal scales relatively small .....	14
13'.	Dorsal scales relatively large .....	15
14.	Ear opening not pectinate anteriorly .....	<i>A. schreiberi</i>
14'.	Ear opening lightly pectinate anteriorly .....	<i>A. yemenicus</i>
15.	Temporal unkeeled .....	<i>A. felicis</i>
15'.	Temporal keeled .....	16
16.	Eyelid barely pectinate, 4th toe strongly pectinate .....	<i>A. boskianus</i>
16'.	Eyelid very pectinate, 4th toe scarcely pectinate .....	<i>A. opheodurus</i>
17.	Temporal scales unkeeled .....	18
17'.	Temporal scales keeled .....	19
18.	Ventrals arranged in 10 straight longitudinal rows .....	<i>A. masirae</i>
18'.	Ventrals arranged in 14—16 oblique longitudinal rows .....	<i>A. grandis</i>
19.	Subocular wedged among 5th and 6th supralabials .....	<i>A. longipes</i>
19'.	Subocular wedged among 4th and 5th supralabials .....	20
19''.	Subocular wedged among 4th, 5th and 6th supralabials .....	21
20.	Ventrals arranged in 12 straight longitudinal series ....	<i>A. gongrorhynchatus</i>
20'.	Ventrals arranged in 14 oblique longitudinal series .....	<i>A. aureus</i>
21.	Ventrals arranged in straight longitudinal series .....	22

21'.	Ventrals arranged in oblique longitudinal series .....	23
22.	First supraocular divided .....	<i>A. haasi</i>
22'.	First supraocular entire .....	<i>A. d. dumerili</i>
23.	Dorsal scales relatively small .....	<i>A. scutellatus</i>
23'.	Dorsal scales relatively large .....	24
24.	Scales on the sides of dorsum double the size of those on central dorsum . .....	<i>A. schmidti</i>
24'.	Scales on sides of dorsum equal to those on central dorsum .....	25
25.	Scales on upperside of tail small and weakly keeled .....	<i>A. d. exiguum</i>
25'.	Scales on upperside of tail large and strongly keeled .....	26
26.	Ear opening with scarce pectination .....	<i>A. arabicus</i>
26'.	Ear opening with strong pectination .....	27
27.	Dorsal scales small .....	<i>A. blanfordi</i>
27'.	Dorsal scales large .....	<i>A. cantoris</i>

## 7. SPECIES GROUPS

I have preferred to use species groups as opposed to subgenera for I feel that these latter with their formalistic character make it more difficult to express the affinities among the species for a particular genus. Although there is no mention of it in the international code of nomenclature, the use of groups of species has now become widespread.

### *micropholis* group

This group is composed of only one species, *A. micropholis*, which is characterized by having two supraoculars, pectinate eyelids, four supralabials anterior to the subocular, and small dorsal scales. The ventrals are arranged in 10 straight longitudinal rows. There are three series of scales on the fingers and the toes present no pectination.

My examination of radiographs of one male and two females showed that males have 24 presacral vertebrae while females have 25. There are 4+2 cervical ribs in the male and 3+2 in the female. In both male and female there are seven caudal vertebrae which are not autotomic.

### *boskianus* group

This group consists of two species, *A. boskianus* and *A. schreiberi*. They are nonspecialized forms with four entire supraoculars, unpectinate eyelids and ear opening, three series of scales on the fingers, and 10 straight longitudinal rows of ventrals.

In reference to the osteology of the group, I examined radiographs of 5 males and 5 females from Cyprus and 6 males and 4 females from Israel all pertaining to *A. schreiberi*. For *A. boskianus*, I examined 6 males and 5 females from northern Africa, 9 males and 5 females from the Nile delta, and 9 males and 8 females from Arabia. As a general rule, the males of both species have 24 presacral vertebrae while the females have 25. Two exceptions are an *A. boskianus* male and female from the Nile delta which have 25 and 24 presacral vertebrae respectively.

We also witness a certain variation in the *boskianus* from Arabia where males might have either 24 or 25 and females either 23, 24 or 25 presacral vertebrae.

The number of cervical ribs, as well as that of sternal ribs, is uniform for all the material examined. On the other hand, the number of nonautotomic vertebrae and vertebrae with double processes vary considerably and, therefore, cannot be used to separate one form from another. The nonautotomic vertebrae range from 6 to 8 in both males and females. With the exception of two specimens, both males and females of *boskianus* from the Nile delta all have seven. The number of vertebrae with double processes ranges from 5 to 7 with the exception of the *boskianus* from northern Africa which only have 3 to 5.

#### ***yemenicus* group**

Four species, *A. yemenicus*, *A. masirae*, *A. opheodurus* and *A. felicis* are included in this group. They are characterized by having four supraoculars, a large ear opening with scant pectination, 8 or 10 straight longitudinal rows of ventrals, three series of scales on the fingers (except *A. masirae* with 4), and scant pectination of the fourth toe.

I have examined radiographs of 11 males and 14 females of *A. opheodurus*, 6 males and 7 females of *A. felicis*, 8 males and 8 females of *A. yemenicus*, and 6 males of *A. masirae*. In *A. opheodurus* the males have 24 or 25 presacral vertebrae, with the exception of one specimen which has 23, and the females have 25, with the exception of three specimens, two with 24 and one with 26. In *A. felicis* and in *A. yemenicus*, the males have 24 and the females 25 presacral vertebrae. The males of *A. masirae* have 24. As far as the number of non-autotomic vertebrae and vertebrae with double processes are concerned, we cannot differentiate one species from another. The former ranges anywhere from 6 to 8, with males usually having one more vertebra than females.

Although *A. opheodurus* and the other species of the group are superficially similar to the species of the *boskianus* group, they are not related. But rather, this is simply a case of convergence. Within the *yemenicus* group, three species are well-related while the fourth, *A. masirae*, has derived characters which point to its greater specialization for living in sandy areas.

### ***tristrami* group**

This group is made up of two species, *A. tristrami* and *A. robustus*. They are characterized by having two supraoculars, eyelids and ear opening without pectination, granular temporals, flat dorsals, 10 or 12 straight longitudinal rows of ventrals, three series of scales on the fingers, and toes without pectination. I have examined radiographs of 3 males and 4 females of *tristrami* and 3 males and 2 females of *robustus*. The number of presacral vertebrae ranges from 25 to 26 in males and 26 to 27 in females for *tristrami*, whereas in *robustus* the males have 25 and the females from 25 to 27. The number of non-autotomic vertebrae is specially high for this group. The *tristrami* males have 11, females have 8. In *robustus*, the males have from 10 to 12 and the females have 8.

### ***grandis* group**

Only one species is included in this group, this being *A. grandis*. It is characterized by having four supraoculars, granular temporals, unpectinate eyelids, 14 or 16 oblique longitudinal rows of ventrals, and four series of scales on the fingers.

Radiographs of three males and three females were examined revealing the pattern of 3+2 cervical ribs and 3+2 sternal ribs. Males have 24 presacral vertebrae while females have 25. There are seven to eight non-autotomic vertebrae in males and seven in females. The number of vertebrae with double processes may be either 4 or 5 in males and 6 in females.

### ***erythrurus* group**

This group consists of five species, *A. erythrurus*, *A. savignyi*, *A. blancki*, *A. boueti*, and *A. guineensis*. They are characterized by having small, granular dorsals which are unkeeled or only barely keeled, three series of scales on the fingers, 8 to 12 straight longitudinal rows of ventrals, one or two supraocular scales, toes with only slight pectination.

Radiographs of 3 males and 5 females of *guineensis*, 1 male and 1 female of *boueti*, 5 males and 6 females of *erythrurus*, 3 males and 2 females of *blancki*, and 5 males and 5 females of *savignyi* were examined. The number of presacral vertebrae reveals a sexual dimorphism. In *guineensis* and in *savignyi*, the males have 25 and females 26. The only *boueti* male examined has 24 and the female 26. All of the males in *erythrurus* have exactly 25 presacral vertebrae while the females vary between 25 and 27. In *blancki*, the males have 25 and the females either 25 or 26.

The cervical ribs present no variation, but rather, the general pattern of three small anterior ribs followed by two larger ones is found in each specimen. As far as the sternal ribs are concerned, it has been found that in all instances there are three ribs on the sternum and two xiphisternums.

The number of non-autotomic vertebrae varies considerably for the group. In *guineensis*, males may vary from 6 to 8 while females from 6 or 7. The *boueti* male and female have 9 and 7 respectively. In *erythrurus*, both sexes may vary anywhere from 7 to 9, while in *blanci* the males vary from 6 to 9 and the females from 7 to 9. In *savignyi* the males vary from 8 to 10 and the females from 7 to 8. The vertebrae with double processes, which follow the non-autotomic vertebrae, were also examined. The *guineensis* male has three while the females have from 2 to 6. The *boueti* female has 5. In *erythrurus*, the males vary from 3 to 6 and the females from 3 to 7. In *blanci*, the males vary from 4 to 6 while the female only has 4. In *savignyi*, the males vary from 4 to 5 and the females from 5 to 6.

#### ***pardalis* group**

Five species, *A. pardalis*, *A. bedriagai*, *A. maculatus*, *A. busacki*, and *A. spinicauda*, are included in this group. They are characterized by having small flat dorsals (in some cases weakly keeled), three series of scales on the fingers, 12 or 14 straight longitudinal rows of ventrals, three supraoculars, and only slightly pectinate toes.

For this group, I examined radiographs of 3 males and 2 females of *bedriagai*, 3 females of *busacki*, 5 males and 7 females of *pardalis* from Alexandria, and 4 males and one female of *pardalis* from Cyrenaica. For *maculatus*, I examined 4 males and 4 females from Morocco, 4 males and 2 females from Tripolitania and 13 males and 4 females from Biskra. For *spinicauda*, I examined 7 males and 3 females.

In *bedriagai* and *busacki* all of the specimens except for one have 26 presacral vertebrae whereas in *spinicauda* the males have 24 and the females 26. In the three *maculatus* populations studied, males have 24 and females 25 presacral vertebrae. The two populations of *pardalis* vary. Both males and females from Alexandria have 24 and 25 respectively while the specimens from Cyrenaica all have 25 except for one male with only 24.

There is considerable variation of sternal ribs within the group. In *maculatus* and *spinicauda*, there may or may not be a free xiphisternum rib whereas in *bedriagai*, *busacki*, and the *maculatus* from Tripolitania there is never one free. In all of the specimens of *pardalis* from both Cyrenaica and Alexandria, there is a xiphisternum rib free. The number of non-autotomic vertebrae varies less in *bedriagai* and *busacki* but is greater than in the other species.

#### ***scutellatus* group**

This group is made up of four species, *A. scutellatus*, *A. aureus*, *A. dumerili*, and *A. longipes*. They are characterized by slender bodies, more or less elongated hindlegs, a pointed snout, pectinate eyelids, somewhat small dorsals, 12 or 14 oblique longitudinal rows of ventrals except for *dumerili*

where they are straight, four series of scales on the fingers, pectinate ear opening, and more or less pectinate fourth toe.

I examined radiographs of 10 males and 10 females of *aureus* and of 10 specimens of *longipes*. For *scutellatus*, I examined 18 males and 14 females from Gargaresc (Tripolitania), 6 males and 9 females from Egypt, and 4 males and 4 females from Kuwait. For *dumerili*, I examined 1 male and 15 females from Trarza Country, 8 males and 8 females from Fort Gouraud, and 4 specimens from Wed Nça-El Alia.

Characteristic of the *scutellatus* group is the minimum or nonexistent sexual dimorphism in the number of presacral vertebrae, this being almost invariably 24. Some specimens may have one extra or one less vertebra. In *longipes* and in the *scutellatus* males from Egypt the number varies from 23 to 24. There is also variation in the number of sternal ribs for this group. In *longipes* we find both types 3 + 1 and 3 + 2 as we do in the *aureus* females and the *dumerili* males from Fort Gouraud. All *aureus* males and both the males and females of *scutellatus* from Tripolitania and Egypt present the pattern 3 + 1. On the other hand, all of the specimens of *scutellatus* from Kuwait present the type 3 + 2.

Evidence shows that the *dumerili* specimens from Fort Gouraud are intermediate between those from Mauritania and Algeria. The number of non-autotomic vertebrae and of vertebrae with double processes reflect a slight sexual dimorphism but are of little help in comparing species and populations.

#### ***cantoris* group**

This group is formed by six species: *A. arabicus*, *A. schmidti*, *A. cantoris*, *A. blanfordi*, *A. gongrorhynchatus*, and *A. haasi*. They are all characterized by having a swollen snout, the subocular separated from the lip, four supraoculars, four series of scales on the fingers, and pectinate ear opening, eyelids and toes.

Radiographs of 7 males and 7 females of *arabicus*, 10 males and 13 females of *schmidti*, 6 males and 3 females of *cantoris*, 7 males and 7 females of *blanfordi*, 1 male and 3 females of *gongrorhynchatus*, and 1 male of *haasi* were examined. The sternal and cervical ribs do not vary from the normal pattern described previously. As far as the presacral vertebrae are concerned, in all of the species with only a few individual exceptions, males have 24 and females 25.

The non-autotomic vertebrae, however, do present an interesting variation for the different species. The *arabicus* males and females have 8 and 7 respectively. In *schmidti*, the males vary from 7 to 8 while the females from 6 to 7. In *cantoris*, males have 8 and females 7, whereas in *blanfordi* both males and females have 7. *A. gongrorhynchatus* stands out with both males and females having 10. The only specimen of *haasi* has 8. The autotomic vertebrae with double processes vary greatly and do not merit further mention.

## 8. HISTORICAL RESUME

The first mention of a species of the genus *Acanthodactylus* was made by Daudin in 1802 in his description of *Lacerta boskiana* from the island of Santo Domingo. There was evidently a mistake in the locality for this species is proper to the Old World. In 1823 in his catalogue of the amphibians and reptiles housed in the Berlin Museum, Lichtenstein described *Lacerta pardalis* from Egypt and redescribed *L. boskiana*.

Several years later Audouin (1829) described *Lacerta scutellata*, *Lacerta savignyi*, and *Lacerta aspera* in a work titled “Description de L’Egypte”. This same year Milne-Edwards (1829) described *Lacerta dumerili* from Senegal. In 1833 Schinz described *Lacerta erythrura* from Spain while the following year Wiegmann set forth the first description of the genus *Acanthodactylus* in his “Herpetologia Mexicana” and, therein, proposed *Lacerta boskiana* as the type-species.

In 1838 Gray described four new species from northern Africa: *Scapteira maculata*, *Scapteira leiocerca*, *Scapteira inornata*, and *Scapteira inaequalis*. Duméril & Bibron (1839) described *Acanthodactylus vulgaris* and *Acanthodactylus lineomaculatus* in their monumental work “Erpétologie Générale”. In 1843 Fitzinger proposed *Chorodromus*, *Ctenodactylus*, *Photopholis* and *Psammoplanis* as new genera. Ten years later, Jerdon described *Acanthodactylus nilgherriensis* from India. In 1864 in two separate papers, Günther described *Acanthodactylus cantoris* from India and *Zootoca tristrami* from Lebanon. Several years later in 1869 Peters published a study in which he described *Acanthodactylus dorsalis*. In 1874 Blanford described *Acanthodactylus micropholis* from Baluchistan, while four years later Boulenger published his first monograph of the genus based on his study of the collection in the Brussels Museum. In this work, he diagnosed the genus and defined five species for it: *A. boskianus*, *A. scutellatus*, *A. vulgaris*, *A. savignyi*, and *A. lineomaculatus*. He also described as new *A. savignyi* var. *schreiberi*.

Also in 1878 Boettger described *A. boskianus* var. *syriacus* from Haifa. In 1881 Lataste described *Acanthodactylus bedriagai* from Algeria. This same year Boulenger in his second monograph of the genus listed ten species: *A. scutellatus*, *boskianus*, *cantoris*, *micropholis*, *syriacus*, *schreiberi*, *bedriagai*, *tristrami*, *vulgaris*, and *lineomaculatus*. For each species, he included a description, synonymy, and habitat and lastly drew up an outline of the affinities among them.

In 1885 we have a new publication of Lataste to whom we owe a good part of the first explorations in northern Africa. In this monograph dedicated to the genus *Acanthodactylus* he described *A. vaillanti* from Somalia and *A. scutellatus* var. *exiguus* from Algeria. Another novelty of this work was his

admitting *A. savignyi* as a species and including *A. bedriagai* in its synonymy. By resurrecting the species *A. savignyi*, Lataste sets out one of the most puzzling problems for those who study the genus. Lataste admitted nine species: *A. tristrami*, *vulgaris*, *savignyi*, *schreiberi*, *vaillanti*, *boskianus*, *micropholis*, *cantoris*, and *scutellatus* with the new approach of including *A. lineomaculatus* in the synonymy of *vulgaris*.

Also in 1885, Boulenger published a synopsis of the genus in the catalogue of the lizards collection in the British Museum, where he maintained the point of view previously put forth by him. Some years later in 1892, Ferreira proposed the variety *bocagei* for the *A. vulgaris* of Portugal. In 1896 Anderson published a book about the Arabian herpetology based on his study of the abundant material available for the two species known there at that time, *A. boskianus* and *A. cantoris*. Two years later, in his compendium "Zoology of Egypt. Reptilia and Batrachia" he studies in detail the species of Egypt and concluded that only three species are found there, viz. *A. boskianus*, *pardalis*, and *scutellatus*.

Anderson established that the typical variety of *boskianus* is limited to the Nile delta while the variety *aspera* occupies the remaining areas. He also pointed out that since the type-specimen had been lost, *Lacerta savignyi* could only be known by the figure in which it had been described and concluded that no *Acanthodactylus* of Egypt fits said description. Anderson agreed with Boulenger in recognizing the similarities between the type-specimens of *A. vaillanti* and *A. savignyi*. In 1899 in a little known work which is difficult to find today, Hemprich & Ehrenberg described *Lacerta platyura* and *Lacerta longicauda* basing their work on the same specimens which Peters used in his description of *A. dorsalis*. They figured the following species: *A. pardalis*, *A. tristrami*, *A. scutellatus*, and *A. boskianus*.

In 1901 Doumergue published a very valuable book about the herpetological fauna in Oran in which he described as new *A. pardalis* var. *spinicauda*, *A. pardalis* var. *intermedius*, *A. savignyi* var. *oranensis*, *A. blanci*, *A. vulgaris* var. *tingitanus*, *A. vulgaris* var. *mauritanicus*, and *A. vulgaris* var. *ksourensis*. Although he described *savignyi* as the variety *oranensis*, he proved that it existed in Oran but nevertheless, acknowledged that the typical variety was found in Egypt. Other findings of Doumergue were his description of *A. blanci* which he considered an intermediate species between *vulgaris* and *savignyi* and his inclusion of a new variety of *A. pardalis* which he called *spinicauda* but which we here raise to the category of species.

In 1903 Günther studied the reptiles collected by Rigenbach in Rio de Oro and described *A. scutellatus aureus*. Six years later in 1909 Boulenger described the new species *A. grandis* from Syria. In 1917 Chabanaud published the results of his explorations in northern Africa where he described the new species *A. boueti* found in Dahomey south of the Sahara. This discovery was of great

significance for the zoogeography of the genus since before that time the southern boundary of the genus was thought to be the Sahara. According to Chabanaud, this new species was intermediate between *Acanthodactylus* and *Latasia*, a genus common to the zone south of the Sahara. The following year, he described *A. senegalensis* which he considered to be closely related to *A. pardalis*. In 1918 Boulenger described the new species *A. fraseri* from Mesopotamia and published a new review of the genus based on his examination of 700 specimens from the collection in the British Museum. He described the following six varieties: *A. vulgaris* var. *atlantica*, *A. pardalis* var. *latastei*, *A. cantoris* var. *blanfordi*, *A. cantoris* var. *arabicus*, *A. scutellatus* var. *longipes*, and *A. scutellatus* var. *audouini*, and admitted the following twelve species: *A. vulgaris*, *tristrami*, *boueti*, *savignyi*, *pardalis*, *micropholis*, *schreiberi*, *boskianus*, *cantoris*, *fraseri*, *scutellatus*, and *grandis*. One year later (Boulenger, 1919) he described *A. boskianus* var. *euphraticus* from Mesopotamia. It was not much long after when he published his monumental survey of the family Lacertidae (Boulenger, 1921) where he further expounded the position he had previously taken in his 1918 review of the genus.

In 1923, Boulenger studied in detail several specimens of *A. grandis* which had been collected by Henri Gadeau de Kerville on his trip to Syria. *A. robustus* from the Syrian desert was described in a study published by Werner in 1929. This same year, Mertens studied the herpetology of Tunisia and with reference to *Acanthodactylus* discussed the status of *A. blinci* defining it as a subspecies of *A. savignyi*. In addition, he considered *schreiberi* and *syriacus* to be subspecies of *A. boskianus*. In 1930 Werner's description of *robustus* was confirmed by K.P. Schmidt after studying another specimen. Angel (1933) studied a collection from northern French Sudan where he identified *A. scutellatus dumerili*, thus expanding the area of distribution for this form previously known to exist only in Mauritania and Senegal. In a later study (Angel, 1936) he examined the collection made by P. Pallary in Syria and Iraq and described *A. tristrami orientalis* from Syria. In 1939 K.P. Schmidt described *A. tristrami iracensis* from Iraq distinguishing it from *orientalis* and the typical form.

Angel (1944) found *A. boskianus* in the central Sahara (Hoggar), thus enlarging the area of distribution for the species. Later in 1946, Scortecci studied the biology of *A. scutellatus* in Fezzan, Libya and defined two varieties, one with pale coloration and small dorsal scales proper to the sandy areas and another with gray coloration and large dorsal scales proper to the stony areas. Haas (1952) studied a collection from Iraq examining, among other species, specimens of *grandis* and *tristrami*. One year later, K.P. Schmidt examined abundant material of *A. boskianus* collected from Yemen. This same year, Riney published his notes about the ecology of *A.t. orientalis*. After examining the specimens collected by Riney, I have found that they are actually samples of *robustus*.

Schmidt & Marx (1956) studied the herpetology of the Sinai peninsula showing in detail the distribution of *A. boskianus* and *A. scutellatus* in the zone. One year later, they expanded the area of distribution to southern Egypt. In 1957 Haas studied a collection from Arabia and described *A. scutellatus hardyi* and *A. cantoris schmidti*. Reed & Marx (1959) found *A. schreiberi* and *A. boskianus* in sympatry in Jarmo in northeastern Iraq while this same year Leviton reported *A. cantoris* in Afghanistan. Bons, Girot & Pasteur (1960) reported *A. cantoris* in the Sinai and discussed the geographic distribution of the species. In 1961 Haas studied a small collection from Arabia deposited in the Carnegie Museum and discussed the status of *A. scutellatus* in this region. In 1963, in a comprehensive analysis of the Iranian herpetofauna, Anderson discussed the persian subspecies of *A. cantoris*.

Bons & Girot (1964) presented a review of *A. scutellatus*, raising *inornatus*, *dumerili* and *longipes* to the rank of species and describing as new the subspecies *A. longipes panousei*. Hoofien (1965) rejected the reporting of *A. cantoris* for the Sinai made by Bons, Girot & Pasteur considering there to have been an error in the locality of the collection. In 1966 Minton extensively studied the Pakistan herpetofauna and examined two species of *Acanthodactylus*, *cantoris* and *micropholis*. Leviton & Anderson (1967) studied the reptiles of Abu Dhabi and described two new species, *A. gongrorhynchatus* and *haasi*. In 1968 Marx published a list of all the Egyptian species accompanied by extensive information about the distribution of the three *Acanthodactylus* species existing there.

In 1969, Haas & Werner studied several species of the genus using material from southwestern Asia. This same year, Papenfuss presented an analysis of the herpetofauna in the arid zones of northern Africa and disclosed new data about the distribution of *A. boskianus*. Clark, Clark, Anderson & Leviton (1969) studied the *A. cantoris* of Afghanistan and pointed out that they belonged to an as yet undescribed subspecies. In 1971, Böhme studied the spiny epithelium of the hemipenis in lacertids including several species of the genus *Acanthodactylus*. Werner (1971) presented new data concerning the distribution of various species in Jordan and later in 1973 published a study of the Sinai with maps of *A. boskianus* and *A. scutellatus*. Also in 1973, Böhme made the first report of *A. boskianus* in Turkey.

Anderson (1974) described the general distribution of the Iranian species and presented an identification key to the herpetofauna. In 1975, Busack studied the ecology of *A. pardalis* in Tunisia. However, after my examining the specimens collected by him, I have found them to actually be *A. scutellatus*. One year later, Busack (1976) published a study of the ecology of *A. erythrurus*. Eiselt (1976) reported *A. boskianus* in southern Turkey and discussed the status of *euphraticus*. In 1977, Arnold & Leviton claimed *A. arabicus* to be a separate species proper to southern Arabia with its subspecies

*schmidti* differentiated in the rest of the peninsula. Böhme (1978) found *A. inornatus aureus* and *A. dumerili* in sympatry in Senegal. This same year, Cissé & Karns (1978) studied the ecology of *A. dumerili* in Senegal.

In two separate papers both in press at the time this study was being prepared, Arnold describes three new species, *A. opheodurus*, *A. felicis* and *A. masirae*, from Oman and discusses the relationships among the different species of the genus. Through his kindness, I was privileged to examine these new forms during my stay in London and they are included in this paper with their names meanwhile published (Arnold, 1980).

Osteological data are provided by El-Toubi & Soliman (1967, 1969), Kamal & Abdeen (1972), Rastogi & Tilak (1964), Siebenrock (1894), and Tilak & Rastogi (1964). Information about the ecology of most of the species is nonexistent. Some disperse data are recorded by Bellairs & Shute (1954), Birkenmeier (1953), Bons, J. (1959), Bons, N. (1962), Bons & Bons (1959), Busack (1975, 1976), Bustard (1961), Cansdale (1950), Cissé & Karns (1978), DeKeyser & Villiers (1956), Doumergue (1901), Dunger (1967), Gauthier (1967), Kolar (1955), Landwehr (1955), Minton (1966), Mosauer (1932), Mosauer & Wallis (1928), Neill (1958), Riney (1953), Scortecci (1940, 1946), Schnurrenberger (1963), Vinciguerra (1928, 1931), Wijffels (1963).

## 9. THE SPECIES OF ACANTHODACTYLUS

### *Acanthodactylus micropholis* Blanford

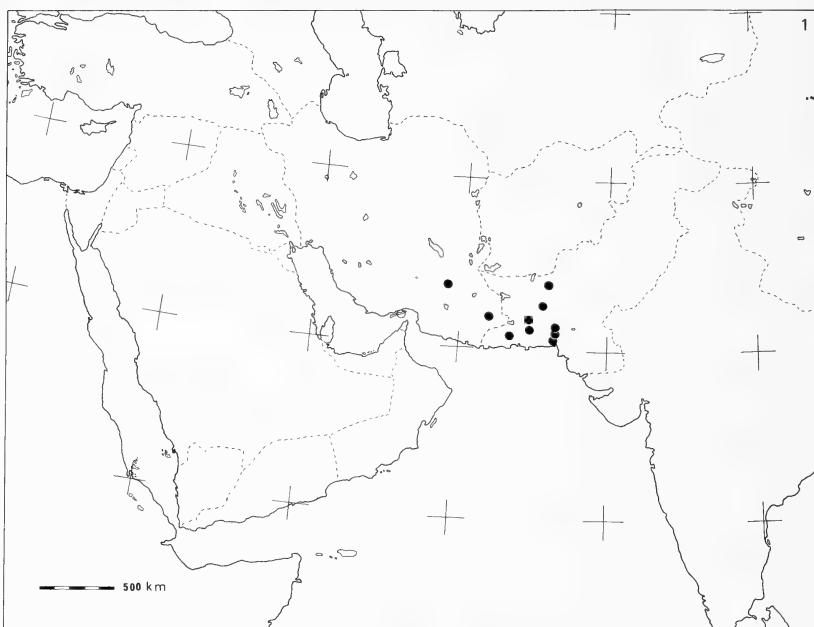
*Acanthodactylus micropholis* Blanford, 1874:33. Type locality: "Gedrosia (Baluchistan)". Syntypes, BM 74.11.23.79 (Rigan), BM 1946.9.3.71—72 (Magas), BM 74.11.23.78 (Bampur).

#### Diagnosis

Two entire supraoculars. One or two rows of granules between the supraoculars and the superciliaries. Pectinate eyelids. Four supralabials anterior to the subocular. Minute unkeeled temporals. Large ear opening with no anterior pectination. Flat dorsal scales equal in size or slightly larger than laterals. Ventrals arranged in 10 straight longitudinal rows. Fingers present three rows of scales. Unpectinate toes.

#### Distribution

According to Minton (1966), *A. micropholis* is found in an area which extends from southeastern Iran to the Porali river in the district of Las Bela in



Map 1. Distribution of *A. micropholis*.

Pakistan. Unfortunately, little recent information about this rare species is available. Only Mertens (1969) and Haas & Werner (1969) have cited several new localities for this species in Pakistan.

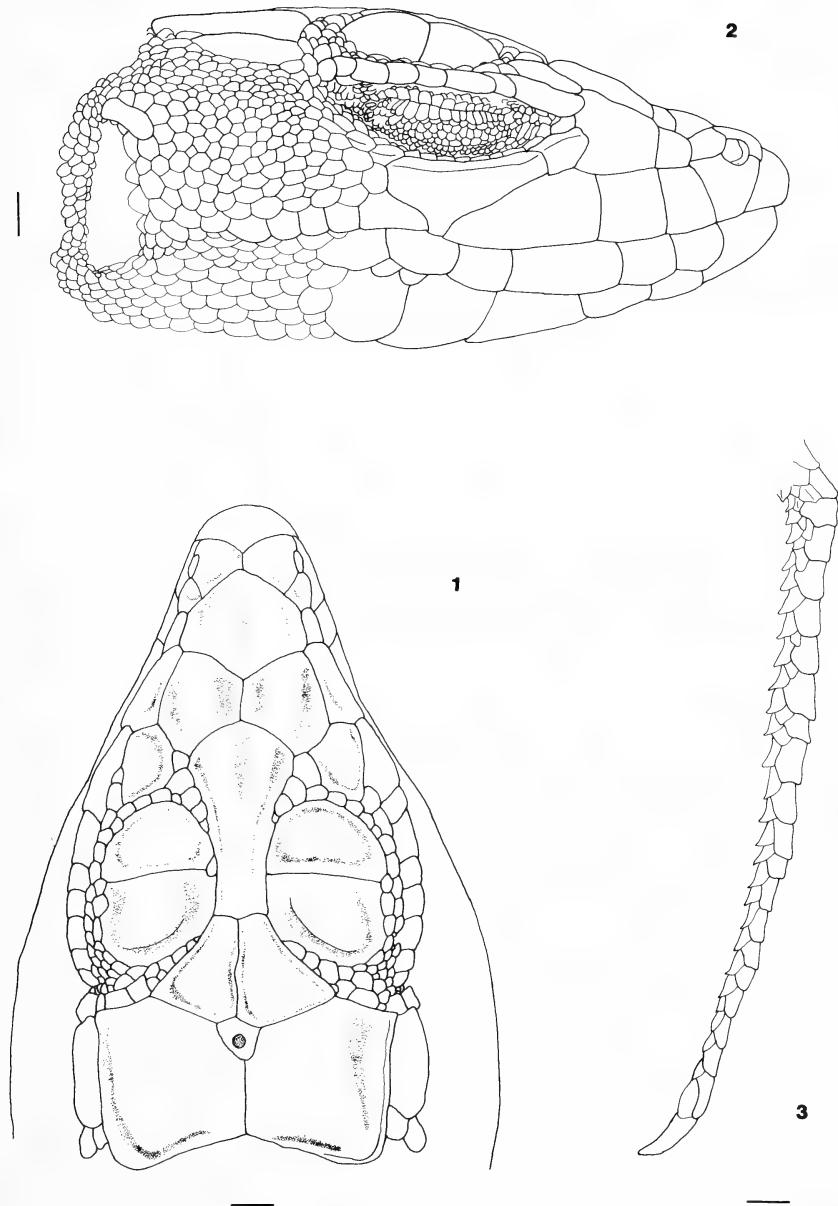
Based on the material that I was able to examine in the California Academy of Sciences, the distribution of *A. micropholis* can now be extended east to Quism Island in the Persian Gulf.

### **Discussion**

Being a species bearing no likeness to any other member of the genus, *A. micropholis* stands alone. We owe the only field notes about this species to Minton (1966) who found it in abundance in sandy river beds and canyons. According to Minton, *A. micropholis* exists in sympatry with *A. blanfordi* only in limited areas at the entrance to coastal canyons. This latter species generally prefers the sandy alluvial plains lying between the coast and the hills.

### **Description**

*A. micropholis* is characterized by a slender, slightly depressed body. The lanceolate concavity is only slightly developed and, therefore, hardly distinguishable. The nasals are slightly raised and extend a little out to the side.



Figs. 1—3. *A. micropolis*. Bampur, Baluchistan. BM 74.11.23.78.

The second and third supraoculars are entire while the first is reduced and separated from the second by a row of granules. There are one or two rows of scales between the supraoculars and the superciliaries, which in turn number from six to eight.

The eyelids are pectinate. The subocular, whose keel is only moderately conspicuous, is either in contact with or separated from the lip. In front of the subocular four supralabials can be counted. The supratemporal is large and flat while the temporals are very small and granular, marked by the absence of keels. The ear opening is large and presents inconspicuous anterior pectination. The tympanic scale is present.

There are five pairs of submaxillaries of which the first three make contact along the center. The gulars, numbering from 28 to 33 down the center, are markedly imbricate but only more or less keeled. A gular fold can more or less be distinguished. A rounded collar is formed by 7 to 12 scales. The dorsal scales, equal in size or slightly larger than the laterals, are small and flat and number from 39 to 54 across the middle of the body. The ventrals are arranged in 10 straight longitudinal rows. On each side 20 to 25 femoral pores join together in one continuous row across the body. There are three series of scales on the fingers. The toes are very long, unpectinate, and equipped with 22 to 25 uncarinate lamellae.

Color pattern. Along the back, there are four dark stripes with the two outermost being reticulate. In the anterior portion there is an additional stripe which later fuses into another in the center portion. Ill-defined reticulation and ocelli cover the hindlegs. There are two bands on each side of the body. The upper one is wide and reticulate while the lower one is smaller and only slightly visible.

### **Specimens examined**

#### **Pakistan**

- Magas, Baluchistan, BM 1946.9.3.71—72 (syntypes).
- Bampur, Baluchistan, BM 74.11.23.781 (syntype).
- 25 km. SW of Nushki, Chagai prov., USNM 159362, 159365.
- 23 mi. E of Turbat, Turbat prov., USNM 158584.
- 23 mi. N of Bela, Las Bela distr., AMNH 85849.
- 16 mi. N of Bela, Las Bela distr., UMMZ 123446.
- 20 mi. N of Bela, Las Bela distr., AMNH 87422—87423.
- Coastal canyons, ca. 30 mi. SW of Liari, Las Bela distr., AMNH 88266—88269.
- 13 km. SW of Panjgur, Makran prov., USNM 159376—7, 159382.
- Nag, 4000', 75 mi. from Panjgur, Baluchistan, MCZ 54440.
- Saradoo, 28 mi. S. of Panjgur, Baluchistan, MCZ 54434—5.
- Boleda, Baluchistan, ZFMK 26283—90.

#### **Iran**

- Rigan (28°37'N, 58°58'E), Narmashir, SE of Persia, BM 74.11.23.79 (syntype).
- Quism Island, Persian Gulf, CAS 96151—2.

### ***Acanthodactylus boskianus* (Daudin)**

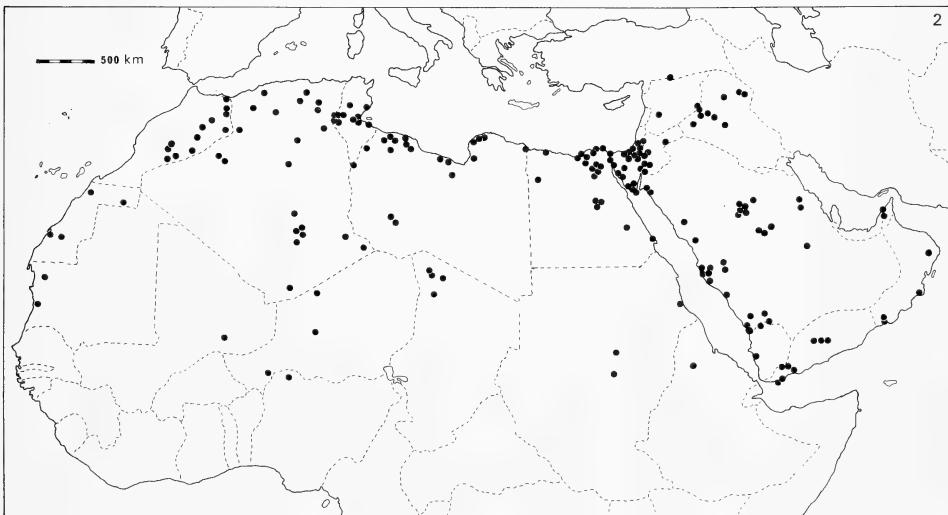
- Lacerta boskiana* Daudin, 1802: 188, pl. xxxvi, fig. 2. Type locality: "L'Ile Saint-Domingue". Holotype, MHNHP 2762.
- Lacerta aspera* Audouin, 1809: 174, pl. i, fig. 10. Type locality: "Egypte". Holotype, not located.
- Scapteira inaequalis* Gray, 1838: 280. Type locality: "N. Africa, Egypt". Holotype, BM 1946.9.3.77.
- Lacerta longicauda* Hemprich & Ehrenberg, 1899, Amph., pl. ii, fig. 5. Type locality: Unknown. Holotype, ZMB.
- Acanthodactylus boskianus* var. *euphraticus* Boulenger, 1919: 550. Type locality: "Ramadieh on the Euphrates". Syntypes, BM 1946.8.4.83—90.

#### **Diagnosis**

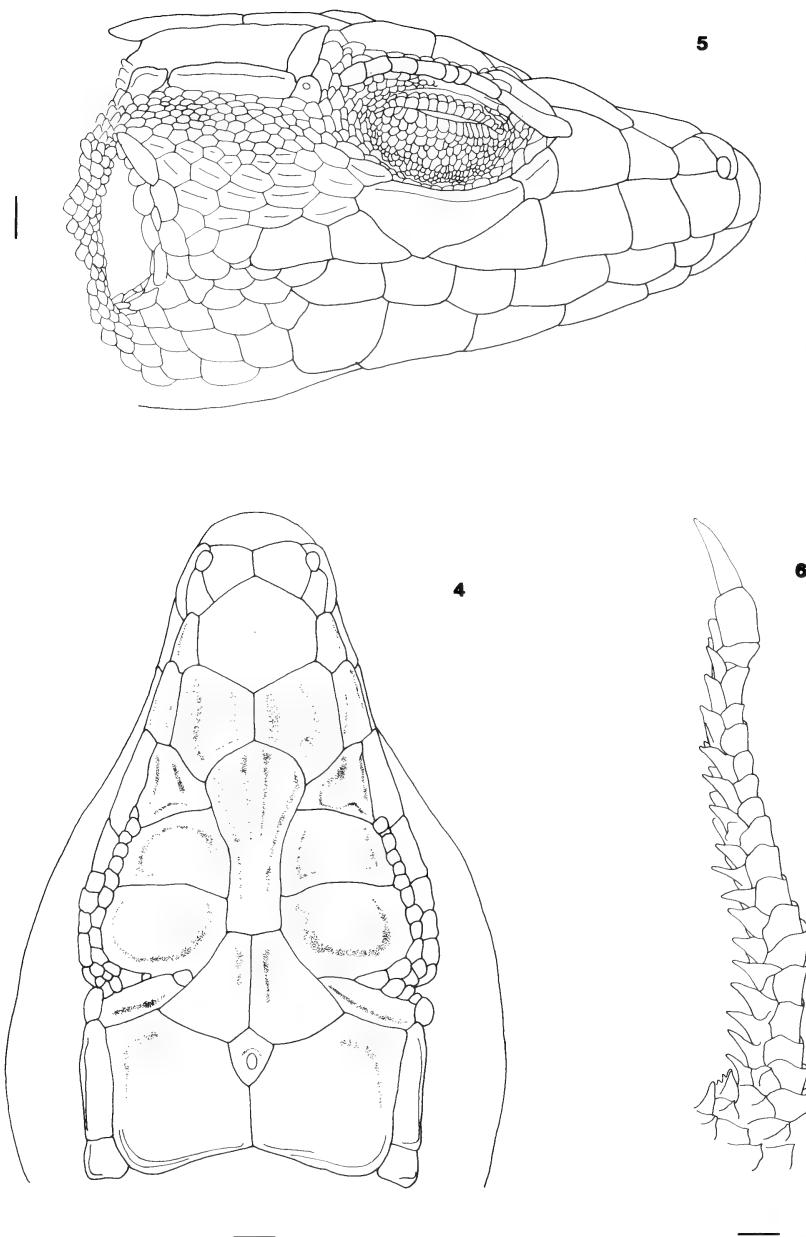
Medium to large size species. Usually four entire supraoculars but, at times, the first one divided. Pectinate anterior border of ear opening. Keeled temporals. Slightly denticulated eyelids. Conspicuous gular fold. Three series of scales on fingers. Ventrals arranged in 10 straight longitudinal rows. Very large, keeled, imbricate dorsals. Granular scalation on sides of the body. Moderate to intense pectination of fourth toe. Large, imbricate, and sharply keeled scales on the upper surface of the tail.

#### **Distribution**

Mauritania, Rio de Oro, Morocco, Algeria, Mali, Niger, Tunisia, Libya, Chad, Nigeria, Sudan, Ethiopia, Egypt, Israel, Jordan, Iraq, Syria, Turkey, Saudi Arabia, South Yemen, Oman, United Arab Emirates.



Map 2. Distribution of *A. boskianus*.



Figs. 4—6. *A. boskianus*. Taohuna, Tripolitania, Libya. BM 1975.1200.

Information for the following countries can be found in the bibliography: Morocco (Aellen, 1952) (Bons, 1959) (Pasteur & Bons, 1960), Egypt (Anderson, 1898) (Marx, 1968) (Schmidt & Marx, 1956), Arabia (Anderson, 1896) (Schmidt, 1953), Algeria (Angel, 1944) (Doumergue, 1901) (Werner, 1937), Mali (Angel & Lhote, 1938) (Papenfuss, 1969), Nigeria (Dunger, 1967), Tunisia (Mertens, 1929), Jordan (Werner, 1971), Syria (Angel, 1936), Iraq (Boulenger, 1919) (Haas & Werner, 1969) (Reed & Marx, 1959) (Schmidt, 1939), Turkey (Böhme, 1973) (Eiselt, 1976).

## Description

*A. boskianus* is characterized by a moderately depressed body. The lanceolate concavity, extending from the frontonasal to the middle of the frontal, is very pronounced. The concave loreal region is heavily marked. There are usually four large supraoculars present; however, at times, the first one is divided. The number of supraciliary scales can range anywhere from 5 to 8 with there more generally being 6 or 7. Although in rare cases two rows may be present, there is usually only one row of granules between the supraoculars and supraciliaries.

There are two supratemporals on each side. Both are sharply keeled, however, the anterior one is considerably larger. Increasing in size from upper to lower, the temporals are large with only a little or medium keel. The anterior edge of the ear opening is denticulated by four or five scales. The lightly pectinate commissure of the eyelid curls outward. There are usually four, but sometimes five, supralabials lying anterior to the subocular.

The subocular, which may or may not be in contact with the lip, presents a very conspicuous keel bordering the orbit. The first three of the five pairs of submaxillaries make contact along the center. There are 21 to 31 gular scales extending in a straight line between the mandibular symphysis and the central scale of the collar. In the anterior section, they are granular while they gradually become larger and overlapped towards the collar.

The collar is either angular or rounded and is made up of 6 to 11 scales. Very large flat dorsal scales grow even larger and more imbricate towards the tail. They become sharply keeled with the point of the keel aimed at the tail. The scales on the side of the body are much smaller, rounded, unkeeled, and not imbricate. There are anywhere from 19 to 55 dorsal scales at midbody.

The scales on the upper surface of the tail are large and sharply keeled numbering from 10 to 17 between the two hindlegs. There are 10 straight longitudinal rows of ventrals, although at times, 12 are present. The shape of the scales of the two innermost rows is trapezoidal while those of the outer rows are square-like. Looking horizontally, the rows are slightly slanted upwards and are either lined up next to each other or overlapped.

The toes present intense external pectination and only scant or completely absent internal pectination. There are 10 to 23 lamellae under the fourth toe. They usually have only one carena; however, in some rare cases, two or three may be found. There are 16 to 27 femoral pores on each side.

Color pattern. In the youngest specimens (snout—vent length 35 mm.) there are seven black bands. Except for at its beginning point, the vertebral band is continuous. At the SVL of 39 mm. the vertebral has already begun to separate in two and continues to do so until the process is completed at the SVL of 44 mm. At this age, eight black bands are present. These remain until the SVL of 55 mm. at which time the pattern may begin to reticulate.

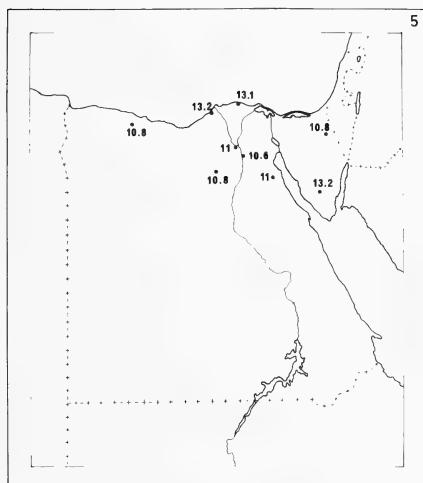
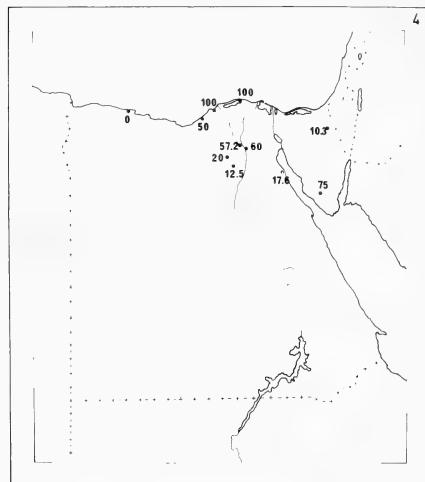
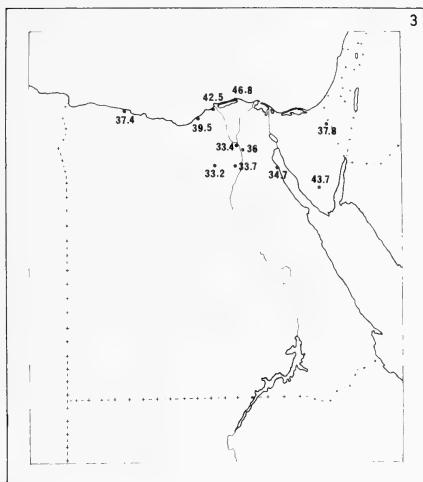
Abundant white ocelli cover the limbs. The undersides are chalky-white. In adults the bands gradually disappear and the body takes on an overall darkish gray coloring. In some adults, however, remains of the bands are conserved.

### Variation

*A. boskianus* is a very well represented species in many collections, as can be seen in consulting the list of specimens examined. I have seen a great number of specimens of this species which has been found to occupy an enormous area and present a definite geographic variation. After comparing samples from northern Africa, Arabia and southwestern Asia, I did not consider it necessary to admit subspecies but, rather, preferred to limit myself to a description of the existing variations. To this end, let's examine four groups of *A. boskianus* populations: firstly, the populations of northern Africa; secondly, those of Egypt; thirdly, those of Arabia; and finally, the populations of Iraq, Syria and Jordan.

The populations of northern Africa are relatively uniform (see tables) suggesting a fairly recent migration to the zone. A slight geographic variation in the number of dorsal scales can be seen with the highest number found in Morocco. Two forms have been traditionally recognized in Egypt and the Sinai (Boulenger, 1921). The first form, *A. b. boskianus*, which inhabits the Nile delta, is characterized by the subocular not bordering the lip, the common division of the first supraocular, and the small but numerous dorsal scales (34 to 52 according to Boulenger, 1921). The second form, *A. b. asper*, is characterized by the lack of subocular contact with the lip, an entire first supraocular, and the large but relatively few dorsal scales (23 to 38 according to Boulenger, 1921).

As the position of the subocular greatly varies in individuals throughout this species' entire area of distribution, this being especially so in Iraq, the taxonomic value of this character is greatly reduced. Using specimens from Baltim, Moya Sulkna, Sakkara, St. Catherine, Burg El Arab, Mersa Matruh, Alexandria-Rosetta, El Dikheila, Cairo, El Quseima, Abu Rawash, and Faiyoum, I



Map 3. Geographical variation in dorsal scale number in northern Egypt samples of *A. boskianus*.

Map 4. % of specimens with the first supraocular divided in northern Egypt samples of *A. boskianus*.

Map 5. Geographical variation in the number of scales between the hindlegs in northern Egypt samples of *A. boskianus*.

have compared the number of scales lying between the hindlegs, the number of dorsal scales, and the condition of the first supraocular. As can be seen in the tables and maps, the geographic distribution for each of these characters reveals a similar pattern; that is, a clinal variation is evident for each one. Although in Israel we find populations which coincide with those from northern Africa, the Sinai specimens coincide with those from the Nile delta.

Arabian populations, specially those living in the centre of the peninsula, are defined by their large size (up to 90mm. of SVL), and strongly keeled and large dorsal scales, numbering 19 to 25 at midbody. Nevertheless, some Saudi Arabi-

Table 1. Comparison of the condition of the first supraocular scale for various populations of *Acanthodactylus boskianus* in Egypt.

Locality	% Divided	% Entire
Baltim	100	—
Moya Sulkna	17.6	82.4
Sakkara	30	70
St. Catherine	75	25
Burg El Arab	50	50
Mersa Matruh	—	100
Alexandria-Rosetta	100	—
El Dikheila	20	80
Cairo	60	40
El Quseima	10.3	85.7
Abu Rawash	57.2	42.8
Faiyoun	12.5	87.5

Table 2. Comparison of number of scales between hindlegs for various populations of *Acanthodactylus boskianus* in Egypt.

Locality	$\bar{X}$	INT.	N	S
Baltim	13.1	11—15	18	1.09
Moya Sulkna	11	10—13	16	0.99
Sakkara	10.9	10—12	10	0.99
St. Catherine	13.2	10—17	7	2.42
Burg El Arab	12.2	12—13	4	0.50
Mersa Matruh	10.8	10—13	5	1.3
Alexandria-Rosetta	13.2	12—14	4	0.95
El Dikheila	10.8	10—12	5	0.83
Cairo	10.6	10—11	5	0.54
El Quseima	10.8	10—12	6	0.98
Abu Rawash	11	10—12	7	1
Faiyoun	11	10—13	7	1.15

Table 3. Comparison of number of dorsal scales for various populations of *Acanthodactylus boskianus* in Egypt.

Locality	$\bar{X}$	INT.	N	S
Baltim	46.8	39—55	18	3.98
Moya Sulkna	34.7	30—39	15	2.57
Sakkara	33.5	29—40	10	3.77
St. Catherine	43.7	39—48	4	4.03
Burg El Arab	39.5	35—44	4	3.69
Mersa Matruh	37.4	35—40	5	1.81
Alexandria-Rosetta	42.5	40—45	4	2.08
El Dikheila	33.2	30—35	5	2.16
Cairo	36	35—38	5	1.22
El Quseima	37.8	34—42	6	3.18
Abu Rawash	33.4	27—38	7	3.99
Faiyoun	33.7	30—40	8	2.86

Table 4. Meristic variation for various populations of *Acanthodactylus boskianus*.

		Scales between hind legs	Femoral pores	lamellae
Eilat Yotvata (Israel)	$\bar{X} \pm SE$ Int. S N	11.5 ± 0.29 10—12 0.78 7	22 ± 1.02 19—26 2.7 7	21.4 ± 0.22 21—22 0.53 7
Abu Rawash (Egypt)	$\bar{X} \pm SE$ Int. S N	11 ± 0.22 9—12 0.97 18	20.9 ± 0.42 18—24 1.79 18	21.2 ± 0.26 19—23 1.11 18
Quarzazate (Morocco)	$\bar{X} \pm SE$ Int. S N	11.3 ± 0.26 10—13 1.11 17	23.4 ± 0.46 21—26 1.93 17	20.6 ± 0.24 19—22 0.75 14
Gabes (Tunisia)	$\bar{X} \pm SE$ Int. S N	11.4 ± 0.24 10—14 0.94 20	22.9 ± 0.33 20—26 1.5 20	20.6 ± 0.24 18—22 1.09 20

Table 5. Variation in number of dorsal and gular scales for various populations of *Acanthodactylus boskianus*.

		Dorsals	Gulars
Eilat Yotvata (Israel)	$\bar{X} \pm SE$ Int. S N	35.5 ± 1.2 31—39 2.94 6	24.7 ± 0.96 22—30 2.56 7
Abu Rawash (Egypt)	$\bar{X} \pm SE$ Int. S N	36.05 ± 0.83 29—43 3.53 18	24.8 ± 0.56 21—29 2.38 18
Quarzazate (Morocco)	$\bar{X} \pm SE$ Int. S N	40.1 ± 0.83 34—47 3.32 16	24.35 ± 0.44 22—28 1.83 17
Gabes (Tunisia)	$\bar{X} \pm SE$ Int. S N	35.6 ± 0.74 32—40 2.28 20	27.3 ± 0.36 25—30 1.62 20

an populations near the North Yemen border (Najran, Abha, Qizan, Saada) have smaller dorsal scales numbering 27 to 36, and Red Sea coast populations are intermediate with 25 to 29.

Let's now turn to the situation in Iraq, Syria, and Jordan. In 1919, Boulen-ger described the variety *euphraticus* characterized by the subocular in contact with the lip, by a divided first supraocular, and by 38 to 43 dorsal scales at midbody. First, we should call attention of the lack of uniformity in the Ramadieh syntypes. In one specimen there is a lack of subocular contact and, on the whole, the series presents a considerable variation in the size of the dorsal scales. In a series of six specimens from Haditha, the dorsal scales are smaller, more numerous and less obviously keeled. The subocular fails to make contact in all of them except for in two where contact is made only on one side. Two specimens from Rutbah and Ana, respectively, have this same partial contact. In each of the seven specimens from Abou Kemal (Syria), however, we find the subocular in contact with the lip. As far as the specimen from Kariatine is concerned, it appears to belong to the form *asper*.

One specimen from Tell Quarma, Jordan (BM 1965.693) has numerous and small dorsal scales numbering 55 at midbody. In addition, the subocular is separated from the lip and the first supraocular is entire. This particular specimen, male, stands out for its very unusually flat and elongated head. In conclusion, we can state that the populations of Iraq, eastern Syria and northern Jordan are defined by their small dorsal scales which are numerous and slightly keeled. Reed & Marx (1959) reported *A. schreiberi* to exist in Jarmo (Kirkuk Liwa, Iraq) in a completely isolated zone far from the nearest known localities for this species in Lebanon. Having examined these specimens (FMNH 74537—74538, UMMZ 117125) which are primarily characterized by their numerous dorsal scales, I have attributed them to *A. boskianus*. However, due to the scarcity of material available from this area, it is as yet impossible to determine if both of these species exist in Iraq.

### **Specimens examined**

#### **United Arab Emirates**

Ash Sharqah ( $25^{\circ}22'N$ ,  $55^{\circ}23'E$ ), Sharjah, MCZ 51484.

Near Camp Yebel Jayah ( $55^{\circ}50'E$ ,  $25^{\circ}06.5'N$ ), BM 1971.1251—2.

#### **Oman**

Between Bai and Salalah, BM 1974.4040—1.

16 km. S of Thumrait, Dhofar, BM 1977.1139—1140.

55 km. towards Thumrait, on road from Salalah, Dhofar, BM 1977. 1151—3.

E of Gebel Faiyah ( $21^{\circ}40'N$ ,  $59^{\circ}22'E$ ), Trucial Oman, BM 1972.1162.

Wadi Qadam (ca.  $18^{\circ}50'N$ ,  $57^{\circ}40'E$ ), BM 1 uncat.

#### **Yemen**

Hodeida ( $14^{\circ}48'N$ ,  $42^{\circ}57'E$ ), FMNH 66513, 66515(4).

#### **South Yemen**

Hadramaut ( $16^{\circ}00'N$ ,  $48^{\circ}53'E$ ), AMNH 1192—4, BM 97.3.11.58—64.

Lagamis Gardens, Shibam ( $15^{\circ}56'N$ ,  $48^{\circ}36'E$ ), FMNH 18453.

Aden ( $12^{\circ}46'N$ ,  $45^{\circ}01'E$ ), BM 95.5.23.58—64.

Haithalhim, near Aden, BM 95.5.23.37—45.

Lahej, wadis between Lahej and the mountains, BM 99.12.13.63.

Wadis below Mt. Manif, near Aden, BM 99.12.13.65.  
 Abian Country, BM 99.12.13.65.  
 El Kubar ( $13^{\circ}51'N$ ,  $45^{\circ}39'E$ ), Amiri country, BM 1903.6.26.11.  
 Seyun ( $16^{\circ}06'N$ ,  $49^{\circ}09'E$ ), Wadi Hadramaut, BM 1953.1.7.27.  
 Hazm ( $15^{\circ}55'N$ ,  $48^{\circ}39'E$ ), Jauf area, BM 1963.773—6.  
 Near Zohra (Zarah,  $13^{\circ}52'N$ ,  $45^{\circ}51'E$ ), BM 1963.778—9.  
 Mahfad ( $14^{\circ}03'N$ ,  $46^{\circ}55'E$ ), BM 1963.780.  
 Scheikh Othman, NHMW 11797(8).

#### Saudi Arabia

Ras Tanura to Ras Mishab, USNM 132400.  
 8 mi. N of Jidda, Sharm Abhur ( $21^{\circ}42'N$ ,  $39^{\circ}05'E$ ), USNM 127997.  
 Jaar ( $23^{\circ}37'N$ ,  $38^{\circ}33'E$ ), CAS 140371.  
 Ghurayyah ( $27^{\circ}55'N$ ,  $35^{\circ}48'E$ ), CAS 142009—12.  
 Baysh ( $17^{\circ}25'N$ ,  $42^{\circ}32'E$ ), CAS 102371.  
 Ryadh ( $24^{\circ}20'N$ ,  $46^{\circ}44'E$ ), CAS 136557—8.  
 32 km.,  $57.5^{\circ}E$  of Taif ( $14^{\circ}35'N$ ,  $43^{\circ}00'E$ ), CAS 139523.  
 Bir Idimah ( $18^{\circ}30'30''N$ ,  $44^{\circ}12'E$ ), CAS 119206.  
 Near El Hada ( $20^{\circ}22'N$ ,  $40^{\circ}16'E$ ), CAS 139540—1.  
 Near Hayr at Wadi Luha ( $24^{\circ}23'N$ ,  $46^{\circ}49'E$ ), CAS 139549—53.  
 Unayzah-Buraydah-Ar Rass area: Ar Rass ( $25^{\circ}52'N$ ,  $43^{\circ}30'E$ ), CAS 97597, 97589.  
 Unayzah-Buraydah-Ar Rass area: Al Badayah ( $25^{\circ}55'N$ ,  $43^{\circ}36'E$ ), CAS 97599.  
 Baljarshi ( $19.8^{\circ}N$ ,  $41.4^{\circ}E$ ), CAS 142013.  
 Royal Saudi Navy, Reservation S of Yiddah (in area  $21^{\circ}07'$ — $21^{\circ}21'N$ , from coast to 6 km. inland), CAS 136502—8, 136511.  
 Hakimah ( $17^{\circ}01'N$ ,  $42^{\circ}50'E$ ), CAS 140445.  
 Wadi Amagk ( $21^{\circ}20.5'N$ ,  $40^{\circ}17.5'E$ ), CAS 139757.  
 Midian ( $27^{\circ}40'N$ ,  $35^{\circ}35'E$ ), BM 77.6.1.2.  
 Jafura ( $24^{\circ}14'N$ ,  $50^{\circ}00'E$ ), BM 1924.11.18.8.  
 S Yabrim ( $23^{\circ}17'N$ ,  $48^{\circ}58'E$ ), BM 1924.11.18.6—7.  
 Rub-Al-Khali ( $20^{\circ}00'N$ ,  $51^{\circ}00'E$ ), BM 1932.10.1.64, 1932.10.1.71.  
 Yidda ( $21^{\circ}30'N$ ,  $39^{\circ}12'E$ ), BM 1934.11.8.18—19.  
 Hejaz ( $24^{\circ}30'N$ ,  $38^{\circ}30'E$ ), BM 1938.2.1.50—53.  
 Ashairah ( $21^{\circ}46'N$ ,  $40^{\circ}38'E$ ), 4000', Hejaz, BM 1938.2.1.57—60.  
 Najran ( $17^{\circ}30'N$ ,  $44^{\circ}10'E$ ), 4400', Hejaz, BM 1938.2.1.61—3.  
 Near Hail ( $23^{\circ}17'N$ ,  $56^{\circ}54'E$ ), BM 1963.762, 1963.764.  
 Bureida ( $26^{\circ}20'N$ ,  $43^{\circ}59'E$ ), BM 1963.766.  
 Near Zilfi ( $26^{\circ}18'N$ ,  $44^{\circ}48'E$ ), BM 1963.769.  
 Kheibar ( $25^{\circ}42'N$ ,  $39^{\circ}31'E$ ), BM 1963.770.  
 Near Saada ( $16^{\circ}52'N$ ,  $43^{\circ}37'E$ ), BM 1963.772.  
 Jarrab ( $26^{\circ}45'N$ ,  $45^{\circ}E$ ), BM 1964.87—8.  
 Artawiya ( $26^{\circ}30'N$ ,  $48^{\circ}25'E$ ), BM 1964.90.  
 Buraiman Camp, near Yedda ( $21^{\circ}39'N$ ,  $39^{\circ}14'E$ ), BM 1964.95, 1975.1201—7.  
 $26^{\circ}05'N$ ,  $44^{\circ}08'E$ , BM 1964.98—9.  
 $26^{\circ}25'N$ ,  $46^{\circ}45'E$ , BM 1964.102.  
 Muwassam ( $16^{\circ}26'N$ ,  $42^{\circ}45'E$ ), BM 1964.298.  
 29 mi. S Qizan ( $16^{\circ}35'N$ ,  $42^{\circ}35'E$ ), BM 1964.299.  
 19 mi. S Qizan ( $16^{\circ}44'N$ ,  $42^{\circ}47'E$ ), BM 1964.300.  
 $26^{\circ}00'N$ ,  $48^{\circ}29'E$ , BM 1970.342.  
 Outskirts of Riyadd ( $24^{\circ}38'N$ ,  $46^{\circ}43'E$ ), BM 1974.4133—4.  
 Yiddah, BM 1976.277.  
 Wadi Fatmeh area ( $21^{\circ}27'N$ ,  $39^{\circ}09'E$ ), BM 1976.1752—5.  
 Abha ( $18^{\circ}13'N$ ,  $42^{\circ}30'E$ ), 7100', Asir, BM 1977.421.  
 Higla, Abha, Asir, BM 1977.422.

**Syria**

Between T-2 and T-1, FMNH 19704.

Abou Kemal (34°27'N, 40°55'E), MNHNP 35.240—4.

Kariatine (34°14'N, 37°14'E), MNHNP 35.239.

**Turkey**

Birecik, Urka prov., ZFMK 13940, 14054—5, 19178—80.

**Iraq**

Haditha (34°07'N, 42°23'E), FMNH 19730(6).

Pipeline near Haditha, Iraq Petr. Co. station K-3, MCZ 56642.

Rutbah (33°02'N, 40°17'E), FMNH 28117.

Pipeline station T-1 (34°13'N, 41°21'E), 1150', FMNH 68768.

Ramadieh (33°25'N, 43°17'E), BM 1946.8.4.83—90 (syntypes of *euphraticus*).

Al Fatha (33°35'N, 44°20'E), Baghdad, BMI 557.

Ana (34°28'N, 41°56'E), BM 1961.1519.

Jarmo, UMMZ 117125.

Chenchemal valley, Jarmo, FMNH 74537—8.

**Jordan**

Jordan valley near Jericho, FMNH 34934.

Ma'an, 10km. S of Aqaba, ZFMK 21030.

Akaba (29°31'N, 35°00'E), MCZ 9713—7.

Fuweila (30°01'N, 35°30'E), MCZ 9791, 9699—9700.

Wadi Kerak, E of Dead Sea (31°15'N, 35°30'E), MCZ 9706—7.

Wadi Ramm (29.6°N, 35.5°E), CAS 140485.

Petra (30°19'N, 35°29'E), CAS 140486, MCZ 9739—51, ZFMK 21037—8.

Wadi Araba (30°10'N, 35°10'E), FMNH 48486.

Neby Musa (32°04'N, 35°42'E), Dead Sea, BM 81.6.6.28.

Jericho, BM 1923.10.12.26.

Wadi Musa (31°58'N, 35°19'E), BM 1965.804.

Tell Quarma (31°47'N, 37°11'E), BM 1965.693.

**Israel**

Refidim, TAU 10751.

Mitle, TAU 10798.

Negev, MCZ 67596.

Revivim (31°02'N, 34°43'E), MCZ 52270.

Wadi Nizana near Beerot Loz, MCZ 96830.

Makhtesh Roman (31°48'N, 35°12'E), MCZ 119476.

Wadi Roman, MCZ 56438, UF 14794(2).

38 km., 13°E of Eilat Yotvata (29°53'N, 35°03'E), UF 13945(7).

Vicinity of Ein Yahav (30°37'N, 35°12'E), UF 13944(3).

Makhtesh Hagadol, 38 km., 110°W of Sedom (30°57'N, 35°01'E), UF 13943.

Abda (30°48'N, 34°46'E), LACM 74329.

Yerushalayim, Romema (31°48'N, 35°12'E), AMNH 57361.

Kurmub (31°01'N, 35°04'E), BM 1952.1.4.66.

Hathrura-Zuweira, BM 1952.1.4.70.

Wadi Minaye, BM 1952.1.4.71—2.

Peir Sunaid, near Gaza, BM 1957.1.12.8.

Kafr-el-Uer, BM 1957.1.12.9—19, 1957.1.12.20—36.

Sdom (31°04'N, 35°24'E), W coast of Dead Sea, BM 1959.1.1.62.

**Egypt**

30 mi. N of Ras Chavab (24°25'N, 34°54'E), USNM 134972—3.

Hebuan, CAS 55178.

- Khanka, El Marq ( $30^{\circ}13'N$ ,  $31^{\circ}21'E$ ), FMNH 66096—9.  
 Lawyel Abu Musallam ( $30^{\circ}32'N$ ,  $31^{\circ}37'E$ ), FMNH 66516.  
 Giza Pyramids ( $29^{\circ}59'N$ ,  $31^{\circ}08'E$ ), UMMZ 113482(12).  
 Affifi Pas'has farm, 6 mi. NW of Giza Pyramids and 16 to 18 mi. NW of Cairo, USNM 131264.  
 Near Giza Pyramids, USNM 136463—75.  
 Gizeh, ZFMK 22903.  
 Abu Rawash, 15 km. NW of Cairo, USNM 130837—8, 130853—9, 133322—8, 134642, 134242—54, 162351—2, 124712, MVZ 9279—80.  
 Near Abu Rawash, USNM 130847.  
 1.5 mi. NW of Abu Rawash, USNM 130790—809, 130810—14, 131466—71.  
 2—3 mi. W of Abu Rawash, USNM 130839—46, 130850—1, 130866—77, 130878—87, 130888—92, 130898—902.  
 2 mi. W of Abu Rawash, USNM 130816—33, 130834—36.  
 4 mi. W of Abu Rawash, USNM 130815.  
 4 mi. NW of Abu Rawash, FMNH 63093—4.  
 Abu Ghalib ( $30^{\circ}16'N$ ,  $30^{\circ}54'E$ ), 6—8 mi. NW Cairo, USNM 131244—5, 134561.  
 Kafr Hakim ( $30^{\circ}05'N$ ,  $31^{\circ}07'E$ ), USNM 134909—10.  
 El Mansuriyah ( $30^{\circ}08'N$ ,  $31^{\circ}05'E$ ), USNM 134816—7.  
 Lisht, near Matarieh, USNM 39123.  
 Cairo, USNM 134700—4, BM 1920.1.20.3815, 1920.1.20.3834.  
 12 mi. NE of Heliopolis ( $30^{\circ}06'N$ ,  $31^{\circ}20'E$ ), AMNH 66251—2.  
 Port Said ( $31^{\circ}16'N$ ,  $32^{\circ}18'E$ ), MCZ 18725, 31389—94, 152220—7, UMMZ 60393(2), BM 1920.1.20.811, 1927.8.13.43.  
 El Gamil, Port Said ( $31^{\circ}17'N$ ,  $32^{\circ}12'E$ ), FMNH 152619—20, 152623—4.  
 Sharbin, Kafr El Battikh ( $31^{\circ}24'N$ ,  $31^{\circ}44'E$ ), FMNH 78866.  
 Burg El Arab ( $30^{\circ}55'N$ ,  $29^{\circ}32'E$ ), USNM 134174—5, 13524—5, 162406.  
 El Hammam ( $29^{\circ}11'N$ ,  $25^{\circ}33'E$ ), USNM 134809.  
 Natron valley, USNM 37270.  
 Chor-El-Agjah, Assuan, ZFMK 22898—900.  
 Inchasse, ZFMK 22901—2.  
 Wadi Natrun ( $30^{\circ}25'N$ ,  $30^{\circ}13'E$ ), FMNH 63967.  
 Mersa Matruh ( $31^{\circ}21'N$ ,  $27^{\circ}14'E$ ), USNM 130338—42, FMNH 63065—70, 63072.  
 Sakara, MVZ 9278.  
 Fayyum ( $29^{\circ}19'N$ ,  $30^{\circ}50'E$ ), USNM 133236—42.  
 Kafr Nahfuz, USNM 136437—59.  
 Kom Ashim, KU 69031.  
 Kom Oshim and Bait El Asfar ( $26^{\circ}49'N$ ,  $31^{\circ}20'E$ ), FMNH 58696.  
 Tel El Amarna ( $27^{\circ}39'N$ ,  $30^{\circ}58'E$ ), MCZ 34970—1, CM 8144, FMNH 593(4), 1856(3).  
 Moya Sulkna, USNM 130597—614.  
 Along Alexandria—Rossetta Highway, USNM 133205—8.  
 El Dikheila ( $31^{\circ}08'N$ ,  $29^{\circ}49'E$ ), USNM 134740—4.  
 Baltim ( $31^{\circ}33'N$ ,  $31^{\circ}05'E$ ), USNM 130403—6, 135340—5, 136302—30, FMNH 63968—74, BM 1927.8.13.45—9.  
 Asyut, Sukkara ( $27^{\circ}16'N$ ,  $31^{\circ}01'E$ ), USNM 130566—76, 130581.  
 Luxor ( $25^{\circ}41'N$ ,  $32^{\circ}39'E$ ), USNM 134936, BM 97.10.28.276—9.  
 Er Rahah, Sinai, ZFMK 22882.  
 Wadi Gharandal ( $29^{\circ}15'N$ ,  $32^{\circ}55'E$ ), MCZ 9702—3.  
 Abu Muelah, Sinai, ZFMK 22883—4.  
 Wadi Faran ( $29^{\circ}36'N$ ,  $33^{\circ}11'E$ ), USNM 131383, 131385, 131420—35, MCZ 9718, 9720—35, ZFMK 22860—8.  
 Wadi Barach, Sinai, ZFMK 22880—1.  
 Nakhla, Sinai, ZFMK 22869—73.  
 Feiran Oasis ( $28^{\circ}42'N$ ,  $33^{\circ}38'E$ ), FMNH 63074—92.

- Mount Sinai Monastery (28°32'N, 33°59'E), MCZ 9704—5, 9708—12.  
 Wadi Babah, Sinai, ZFMK 22885—7.  
 Camp Rafah (31°17'N, 34°14'E), USNM 163521.  
 St. Catherine (28°31'N, 33°57'E), USNM 133601—8, 133635.  
 Al Quseima (30°40'N, 34°22'E), USNM 133516—24.  
 El Arish (31°09'N, 33°49'E), USNM 133497, ZFMK 22874—9.  
 Serabit-El-Khadem (29°00'N, 33°27'E), FMNH 58695.  
 Maryut (31°01'N, 29°48'E), BM 97.10.28.271.  
 Alexandria (31°12'N, 29°54'E), BM 97.10.28.241—50.  
 Ramleh, near Alexandria (31°15'N, 29°54'E), BM 97.10.28.251—60.  
 Abukir (31°19'N, 30°04'E), BM 97.10.28.261—4.  
 Edku (31°18'N, 30°18'E), BM 1927.8.13.51—5.  
 Salhia (30°40'N, 26°54'E), BM 1927.8.13.50.  
 Gahrbariat (30°53'N, 29°30'E), BM 1976.1722—3.  
 Moses Wells, near Suez, BM 97.10.28.272.  
 Tor, Sinai (38°14'N, 33°37'E), BM 1909.9.17.2—3.  
 Wed Hebron, Mt. Sinai, BM 82.8.16.2—5.  
 Mokattan mountains, Cairo, ZFMK 22892—4.  
 Gebel Hammam Farum (29°12'N, 32°58'E), BM 1914.8.17.9.  
 Beni Suef, ZFMK 22891.  
 Suez, BM 97.10.28.265—70.  
 Gebel Maryut, N Egypt, BM 1903.5.28.12.  
 Heliopolis, near Cairo, BM 99.9.5.5.  
 Giza, BM 97.10.28.273—5.  
 Assuan (24°05'N, 32°53'E), BM 97.10.28.286.  
 Suakin, BM 97.10.28.287—96.  
 Erkovit, near Suakin, BM 1914.5.14—15.  
 Mohammadieh (27°44'N, 34°15'E), BM 1927.8.12.33.  
 Delingat, BM 1927.8.13.57.  
 Kafr-El-Dawar (31°08'N, 30°07'E), BM 1927.8.13.56.  
 Near Kom-Aushim (30°17'N, 30°59'E), BM 1927.8.13.44.  
 Kafr-El-Elw, BM 1974.5219—47.  
 Helwan (29°51'N, 31°20'E), BM 1974.5255—7, ZFMK 22895—7.  
 Wadi Garawi (29°47'N, 31°19'E), BM 1974.5260—1.  
 El Shourafa (29°44'N, 31°18'E), BM 1974.5262—3.  
 Ismailia (30°35'N, 32°16'E), MNHNP 8532(3).

### Ethiopia

- Takale, AMNH 20156.  
 Loulla, Annesley Bay, Eritrea, BM 69.11.4.13.  
 Wakhiro, Eritrea, BM 1962.142.

### Sudan

- Port Sudan (19°37'N, 37°14'E), MCZ 31410.  
 Khartum (15°36'N, 32°32'E), BM 1909.10.15.21—4, 1924.5.21.1—2.  
 Duem (14°00'N, 32°19'E), BM 1901.7.31.2.  
 Fakus, Sharkia prov., BM 1927.8.13.41—2.

### Nigeria

- Kware (13°13'N, 5°16'E), 15 mi. N of Sokoto, BM 1962.1659.  
 Mi. 5 on the Sokoto—Kware road, BM 1966.341.

### Chad

- Zoui (21°20'N, 17°04'E), Tibesti, BM 1954.1.6.1.  
 Bardai (21°21'N, 16°59'E), Tibesti, BM 1954.1.6.2.

Yebbi Bou (20°58'N, 18°04'E), Tibesti, BM 1962.288—9.  
 Gmelia, Sherda (20°08'N, 16°45'E), Tibesti, BM 1962.291—2.

### Libya

Benghazi (32°12'N, 20°11'E), 2km. N of Coefia, USNM 146795.  
 Marble Arch (30°28'N, 18°34'E), FMNH 82939.  
 Wadi Kaam (32°07'N, 13°01'E), FMNH 82935.  
 Balat (28°15'N, 19°15'E), BM 1909.7.28.38—9.  
 Benghazi (32°07'N, 20°04'E), BM 1954.1.5.79—86.  
 Tolmeta (32°43'N, 20°57'E), BM 1954.1.5.87—90.  
 Fezzan, BM 1954.1.5.91—7.  
 E of Ghadames (30°08'N, 9°30'E), BM 1954.1.5.98.  
 Mourzouk (25°55'N, 13°55'E), BM 1954.1.5.99.  
 Jebel Soda (31°29'N, 13°04'E), BM 1954.1.6.3.  
 Homs (32°39'N, 14°16'E), BM 1955.1.8.55.  
 Leptis Magna (32°38'N, 14°18'E), BM 1955.1.8.56.  
 40km. S of Beni Ulid, Tripolitania, BM 1955.1.8.57.  
 Taghen (25°59'N, 14°26'E), BM 1956.1.1.7.  
 Agedabia (30°46'N, 20°14'E), BM 1932.3.6.6.  
 Jarhuna (30°47'N, 17°50'E), BM 1965.1137.  
 72 km. E of Nofilia, Tripolitania, BM 1965.1247.  
 Nalut (31°52'N, 10°59'E), BM 1965.1248.  
 Km. 32 on the Ben Guiad—Sirte road. Tripolitania, BM 1965.1249.  
 Ain El Amenia (31°55'N, 12°13'E), 1000', BM 1965.1250.  
 Capuzzo, Cyrenaica, BM 1965.1251—3.  
 Bnega, Cyrenaica, BM 1965.1254.  
 Taohuna (32°23'N, 13°16'E), BM 1975.1200.

### Tunisia

Tunis, ZFMK 22907.  
 Sfax (34°44'N, 10°46'E), FMNH 83761—2.  
 18 km. W of Nefta, CAS 138670.  
 Sbeitla (35°14'N, 9°08'E), ruins of Suffetula, CAS 138715—24.  
 40 km. W of Gabes on road to Gafsa, CAS 138961.  
 Djerba island, ZFMK 14713.  
 Gabes (33°53'N, 10°07'E), FMNH 83727—30, BM 1966.423—5.  
 Village de Chenini (33°52'N, 10°04'E), CM 56661—2.  
 2.5 km. W and 6 km. N of Gabes at Rhennouch (33°56'N, 10°04'E), CM 56557(12), 56535,  
 56487—91, 56472, 56597—8.  
 4.4 km. W and 12.6 km. N of Gabes, 7 km. N of Rhennouch, in beach area of coastal dunes,  
 CM 56756—7, 56654(9), 56647—53, 56643—4, 56612—4, 56582(15), 56578, 56566—72,  
 USNM 195327—36.  
 Stil, 10 km. W of Tozeur, ZFMK 18029—33.  
 Uhdrif, Gebel-El-Medo, Gabes, ZFMK 22904—06.  
 10.7 km. E and 15 km. S of Gabes at Oued El Ferd (33°46'N, 10°15'E), CM 56562,  
 56496(13).  
 3 km. W and 3.5 km. S of Gabes at Cascade de Chenini, CM 56760—1, 56708—10.  
 9 km. W of Gabes on road to Gafsa, CAS 138959—60.  
 26 km. E and 24 km. S of Gabes at Zarat (33°40'N, 10°21'E), CM 56605—7.  
 1 km. S of Steftimi (33°48'N, 9°01'E), CM 56552.  
 1 km. N and 3 km. E of Aouinet (33°59'N, 10°00'E), on coastal dunes, USNM 195316—26,  
 CM 56521.  
 Gafsa, Oued Baiech (34°20'N, 8°44'E), UCM 36867.  
 20 km. W of Gafsa, Djebel-Es-Stah (34°05'N, 9°30'E), UCM 36853—65, CM 54551.

43 km. W of Gafsa, Bled Douarah, UCM 36848—52, 36437.  
 2 km. E and 10 km. N of Tozeur at El Hamma du Djerid ( $34^{\circ}00'N$ ,  $8^{\circ}09'E$ ), CM 56680(10).  
 Duirat, BM 91.5.4.97—100.  
 Zarzis ( $33^{\circ}30'N$ ,  $11^{\circ}07'E$ ), BM 85.4.13.6.  
 Taouz, EBD 2436—7.

#### Niger

5 km. NE de Agadez, LACM 108943—6.  
 Adrar Bouss ( $08^{\circ}40'E$ ,  $20^{\circ}N$ ), Air, BM 1970.1757.  
 35 km. NW of Dogondouchi, BM 1976.1177.

#### Mali

12 mi. S of Gao, MVZ 81419, 81422—3, CAS 103250—6.  
 Segou ( $13^{\circ}27'N$ ,  $6^{\circ}16'W$ ) MNHNP 1932.135.

#### Algeria

Kreider ( $34^{\circ}09'N$ ,  $0^{\circ}04'E$ ), MCZ 27408—9, 27411—5, 27417, 27419—23.  
 30 km. S of Ain Sefra, LACM 108908.  
 Tamanrasset ( $22^{\circ}47'N$ ,  $5^{\circ}31'E$ ), CAS 135971, ZFMK 20164, MNHNP 1930.167—9.  
 W of Tamanrasset, ZFMK 20165—6.  
 Tamanrasset airport, CAS 130681.  
 3 km. E of Tamanrasset on road to Adriane, CAS 138652—9.  
 Guelta Afilale ( $23^{\circ}09'N$ ,  $5^{\circ}45'E$ ), 75 km. NE of Tamanrasset on road to Assgkrem, CAS 138615, ZFMK 18035—6.  
 Tassili Plateau, Djanet ( $24^{\circ}34'N$ ,  $9^{\circ}29'E$ ), CAS 138534—9.  
 Laghouat ( $33^{\circ}48'N$ ,  $2^{\circ}53'E$ ), MCZ 4633—5.  
 Sidi Okba ( $34^{\circ}45'N$ ,  $5^{\circ}54'E$ ), USNM 49828, BM 1920.1.20.1303b.  
 Bou Saada, BM 85.4.13.4, 1920.1.20.1303, MNHNP 8534(2).  
 Between Biskra and Laghouat, BM 1920.1.20.1303a.  
 Tuggurt ( $33^{\circ}06'N$ ,  $6^{\circ}04'E$ ), BM 91.5.4.94—6.  
 Ghardaia ( $32^{\circ}29'N$ ,  $3^{\circ}40'E$ ), BM 1920.1.20.1303.c.  
 S of Ghardaia, BM 1912.11.9.60.  
 Between Wed Nça and El Alia, BM 1912.11.9.61.  
 NE of El Golea, BM 1912.11.9.56—8.  
 Between El Golea and Wed Saret, BM 1912.11.9.59.  
 N of El Gueltara, BM 1912.11.9.62—3.  
 Ain Sefra, BM 1913.7.3.62—7.  
 El Kreder, BM 1920.1.20.3868.  
 Arak Tit ( $22^{\circ}58'N$ ,  $5^{\circ}11'E$ ), Ahaggar Mts., BM 1932.9.10.16—8.  
 Bördj Medjez ( $35^{\circ}53'N$ ,  $4^{\circ}38'E$ ), BM 1920.1.20.3005, 85.4.13.5.  
 20 km. N of Tadjemait, ZFMK 18034.  
 Bonguelffaia Tilsent, BM 1920.1.20.1303.d.  
 El Golea, BM 1969.2116, ZFMK 18037—41.  
 Biskra, BM 1969.2117, ZFMK 22908—11.  
 Bir Stail, Biskra, ZFMK 22912—4.  
 Hammam Meskontine, BM 1969.2218—9.  
 Kerzaz ( $29^{\circ}27'N$ ,  $1^{\circ}25'W$ ), BM 1971.723.  
 Algiers, BM 58.6.1.30.  
 In Ameri ( $20^{\circ}20'N$ ,  $5^{\circ}30'E$ ), 2400 m., Hoggar, MNHNP 1930.121—2.  
 Azaka Emiré ( $17^{\circ}00'N$ ,  $4^{\circ}00'E$ ), Tassili, MNHNP 1936.69.  
 Assakao, Tassili, MNHNP 1936.70.  
 In Ezzan ( $23^{\circ}29'N$ ,  $11^{\circ}15'E$ ), Tassili, MNHNP 1931.71.  
 Ararane ( $23^{\circ}06'N$ ,  $5^{\circ}04'E$ ), Hoggar, MNHNP 1932.131.  
 In Kelmet, Hoggar, ZFMK 22919.  
 Imegha, Hoggar, MNHNP A-149-51.

Oued Ouhat, Hoggar, ZFMK 22920.  
 Beni Abbes (30°08' N, 2°10' W), MNHNP 55.7.  
 Oued Tinourth, Hoggar, ZFMK 22921.  
 Tahiaout, Hoggar, ZFMK 22922—4.  
 Djanet, Tassili, MNHNP 1936.66—8.  
 Amguid (26°26' N, 5°22' E), Hoggar, MNHNP 32.136.  
 La Marmia (34°51' N, 1°44' W) MNHNP 1974.257—8.  
 Oued Abu, S Ouargla, ZFMK 22915—8.

#### Morocco

Near Ksabi, CAS 92436.  
 Oglat Sedra (33°42' N, 2°08' W), MCZ 31436—7.  
 Mouths of Moulouya river, CAS 92439, ZFMK 20167—8.  
 Shores of Moulouya river at Teggour (33°11' N, 3°51' W), 22 km. N of Missour, CAS 92437.  
 16 km. of Tazenakht, on the road to Taroudant, CAS 92435.  
 Tazenakht, ZFMK 26195—6.  
 22 mi. S of Ouarzazate, CM 55185—8.  
 2.4 mi. SE of Ouarzazate, CM 55189—94.  
 2.4—6 mi. S of Ouarzazate, CM 55170—9.  
 6 mi. S of Ouarzazate, CM 55180—4.  
 Shores of the Oued Draa at Tamkasselt, Mimou, CAS 92433.  
 4 km. S of Foum-Zguid, USNM 196424.  
 5 km. W of Modar Salaam, BM 1970.235.  
 20 km. W of Ouarzazate, BM 1970.236.  
 8 km. W of Tinerhir (31°31' N, 5°32' W), BM 1970.237.  
 150 km. S of Berguent, BM 1970.238—40.  
 Oued Ouarzazate (30°55' N, 6°55' W), 2 km. NW of Ouarzazate, BM 1972.2286, 1972.2290,  
 1972.2296, 1972.2303—7.  
 Bou Rbja, near J. Bani, ZFMK 26197.  
 Ain Chebbak, W Saidia, ZFMK 26198—200.  
 Near Imini river, Tifoultout (30°56' N, 6°59' W), Oued Ouarzazate, BM 1972.2287—9.  
 Douar Chemesse (31°32' N, 8°17' W), NW of Ouarzazate, BM 1972.2291, 1972.2299—300.  
 3 km. E of Ouarzazate, BM 1972.2292, 1972.2302.  
 Ouarzazate—Zagora road, Oued Ouarzazate, BM 1972.2293—4.  
 Tifoultout, 5 km. NW of Ouarzazate, BM 1972.2295.  
 Ouarzazate, near the hospital, BM 1972.2297.  
 7 km. of Zagora, BM 1972.2298.  
 500 m. N of Fednagoum, 4 km. of Ouarzazate, BM 1972.2301.  
 7 km. SW of Taouz, MNHNP 1970.1036.  
 Berguent (34°01' N, 2°01' W), 918 m., MNHNP 1925.173.

#### Mauritania

15 km. N of Nouakchott airport, CAS 134603, 134609, 134612—5.  
 Between Akjoujt and the ocean, MNHNP 1937.44.

#### Rio de Oro

Messeied oasis (27°03' N, 13°05' W), 13 mi. SE of El Aaium, CAS 123371, EBD 2433.  
 Tachektent (23°36' N, 15°51' W), MNHNP 1938.190.  
 Lemraigenat, 40 km. E of Tifariti, EBD 5187.  
 Sidi Bulla, EBD 6223, 6218, 6215—7.  
 Melhar Negyir, EBD 5537—40, 2431.  
 Tafudart, Seguiat Al Hamra, EBD 2434—5.  
 El Aium, EBD 5536.  
 Ain Najla, Seguiat El Hamra, EBD 2432.  
 Udei Chatar, EBD 7234.

### ***Acanthodactylus schreiberi* Boulenger**

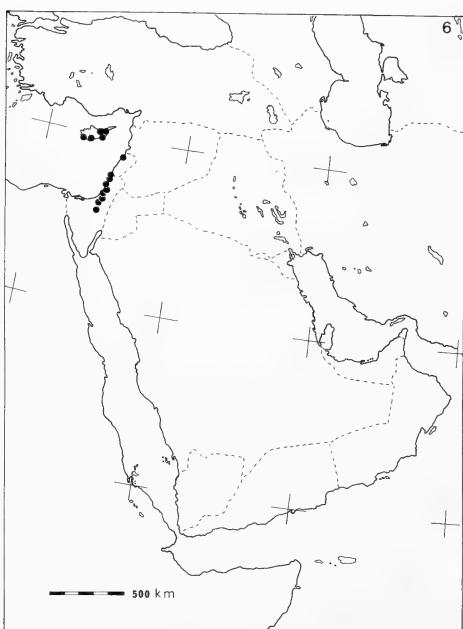
#### **Diagnosis**

Usually four large entire supraoculars. Large ear opening with no anterior denticulation. Unpectinate border of eyelids. Subocular separated from lip and lodged between the fourth and fifth supralabial. 31 to 36 gular scales down the middle of the neck. Very small dorsal scales, granular in the Cyprus form and flat and sharply keeled in the continental form, numbering 43 to 64 at mid-body.

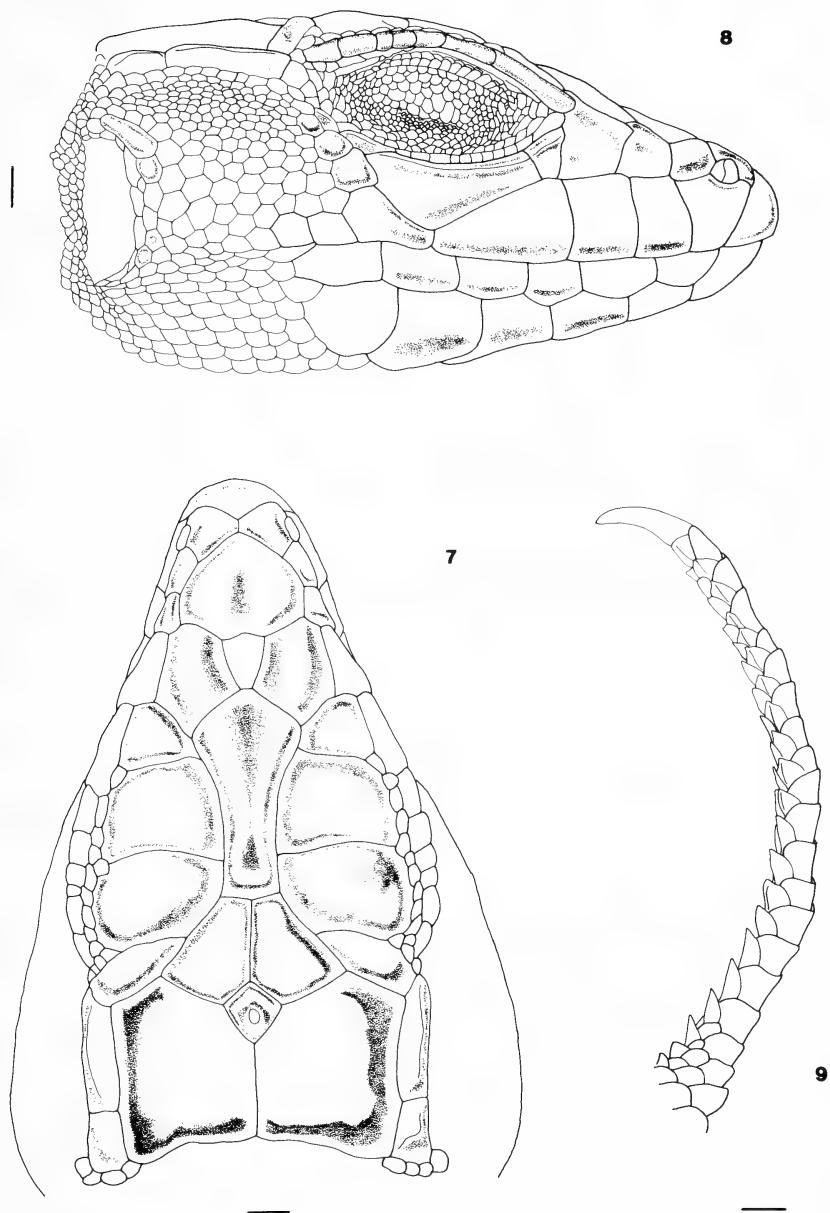
Small, granular and smooth temporal scales in Cyprus; large and keeled on the continent. The scales of the upper surface of the tail medium-sized in Cyprus, larger and sharply keeled on the continent. 10 straight longitudinal rows of ventrals. Toes with only slight lateral denticulation.

#### **Distribution**

*A. schreiberi* is found in Cyprus, Israel, and Lebanon. In 1959, Reed & Marx reported its presence in Jarmo, Iraq, in an area cut off from the other known localities by an entire country, Syria, where no trace of it has yet been found. I have had the chance to examine these specimens and have, instead, included them under *A. boskianus*.



Map 6. Distribution of *A. schreiberi*.



Figs. 7—9. *A. schreiberi schreiberi*. Paphos, Cyprus. BM 1972.1963.

## Discussion

It seems hard to believe that this species has such a limited area of distribution. Despite Reed's & Marx' claim, I do not believe the species is present in Iraq. Distinguishing between the populations of *A. boskianus* in Iraq, Syria, and Jordan and *A. schreiberi* is far from a simple task, especially because the former are characterized by small slightly keeled dorsals. I find the present evidence insufficient and feel it is necessary to examine more material from the aforementioned countries before this matter can be resolved.

## Description

This species is characterized by a moderately depressed body. The lanceolate concavity running from the frontonasal to the middle of the frontal is very prominent in Lebanon while less accentuated in Cyprus. The snout is slightly pointed and capped by a protruding nasal region. Generally, there are four large entire supraoculars and 5 to 8 superciliaries with a row of granules between the two. There are two supratemporal scales. Although the posterior one is small, they both present a very distinct longitudinal keel. In Cyprus, the temporal scales are small and granular while in Lebanon, they are large and keeled.

The large ear opening has no anterior denticulation and neither does the border of the eyelid. The lower lid is covered with medium-sized scales. There is a distinctly keeled subocular bordering the orbit, lodged between the fourth and fifth supralabial and separated from the lip. Four supralabials lie anterior to the subocular. The first three of the five pairs of submaxillaries meet along the center. The gulars range from 31 to 36 down the center line of the neck. A rounded or angular collar is formed by 8 to 10 scales.

The dorsal scales are very small and range from 43 to 64 across the middle of the body. They are smooth in the Cyprus form but flat and sharply keeled in the continental form. The scales on the upperside of the tail are medium-sized in Cyprus and significantly larger and sharply keeled on the continent. The ventrals are arranged in 10 straight longitudinal rows. There are 22 to 29 femoral pores on each side of the body. A slight lateral denticulation can be seen on the toes, and under the fourth one there are 20 to 23 unicarinate lamellae.

**Color pattern.** Young specimens have a total of eight pale stripes: two vertebrals which become one towards the back and, on each side of the body, one superciliar, one subocular, and one almost ventral. The limbs are dark with minute but visible white ocelli. In adult specimens, remains of these eight stripes form a characteristically faint and very irregular pattern. The white ocelli sprinkling the limbs are somewhat larger than in the young. The general color is a sandy gray.

### ***Acanthodactylus schreiberi schreiberi* Boulenger**

*Acanthodactylus savignyi* var. *schreiberi* Boulenger, 1878: 188. Type locality: "Egypte, en Algérie et en Crimée". Restricted to "Cyprus" (Boulenger, 1921). Holotype, not seen, probably in Brussels Museum.

#### **Diagnosis**

As for the species except the character states listed for *A. s. syriacus* (see below).

#### **Specimens examined**

##### **Cyprus**

Larriaka, MCZ 25924.  
 Larnaka, USNM 37274, BM 1903.4.8.2.  
 Paralimni, USNM 166446—9.  
 Trikomo, USNM 30859.  
 Nicosia, BM 1962.570, ZFMK 21264.  
 Limassol, BM 1930.3.12.6—7.  
 Famagusta, ZFMK 14447—50, 14453.  
 Mia Milea, BM 1952.1.4.23.  
 Tomb of Kings, Paphos, BM 1972.1957—64.  
 Dhavlos, foot of Kyrenia Range, BM 1973.2923—4.

### ***Acanthodactylus schreiberi syriacus* Boettger**

*Acanthodactylus boskianus* var. *syriacus* Boettger, 1878: 69. Type locality: "Haifia". Lectotype, SMF 13633.

#### **Diagnosis**

This continental subspecies is distinguished by flat keeled dorsal scales larger than the laterals, a more pronounced lanceolate concavity, the lower temporals being larger and keeled, larger and more prominently keeled scales on the upper surface of the tail.

#### **Specimens examined**

##### **Israel**

Tel Aviv, AMNH 58807—12, 58829—32, 61083, 62094—6, ZFMK 7095—6, BM 1952.1.4.56—61.  
 Tel Aviv, Arab Cemetery, on the coast S of Yarkon river, UF 13906(2), 13907—10, 13911(4).  
 3 km, 40° W of Rishon Le Zion, UF 14863(3).  
 Hadassim (32°17'N, 34°53'E), TAU 856.  
 Geman (31°30'N, 34°41'E), MCZ 107686.  
 Asluj (31°01'N, 34°46'E), FMNH 62571.  
 Revadim (31°46'N, 34°49'E), MCZ 96590.  
 Giv'at Olga (32°27'N, 34°53'E), MCZ 61210.  
 4 km., 117° W of Hadera, UF 13947.  
 Hadera (32°26'N, 34°55'E), TAU 6679.

Coastline near Hadera island, MCZ 52272.  
 Sarafand (31°56'N, 34°48'E), CAS 87415.  
 Ein Hamifratz (32°54'N, 35°06'E), AMNH 88376.  
 Rosh-Hanikra coast near the Lebanon border (33°05'N, 35°06'E), MCZ 56442.  
 Kfar Masaryk, BM 1952.1.4.55.  
 Atlith (32°41'N, 34°56'E), BM 1959.1.1.59.  
 Beer-Sheba (34°14'N, 34°47'E), MNHN P 8668(4).  
 Rehovot (31°54'N, 34°49'E), LACM 74332.  
 Gaza, ZFMK 22782.

**Lebanon**  
 Beirut, MCZ 9300, CAS 53989, BM 62.8.13.9—10, 1920.1.20.920, MNHN P 1900.78., 1905.46.

### ***Acanthodactylus masirae Arnold***

*Acanthodactylus masirae* Arnold, 1980: 303, pls. E (p. 303), C (p. 295). Type locality: "North point, Masirah Island, Sultanate of Oman". Holotype, BM 1975.1226.

#### **Diagnosis**

Small and slender species with relatively long hindlegs. Head rounded posteriorly with narrow pointed snout. Lanceolate concavity slightly conspicuous. Four large supraoculars. One row of granules between the supraoculars and the superciliaries. Smooth and granular temporal scales. Large ear opening slightly pectinate anteriorly.

Pectinate eyelids with large scales covering lower lids. Four supralabials lying anterior to the subocular. Subocular bordering the orbit. Four series of scales on fingers. 10 straight longitudinal rows of ventrals. Flat, keeled dorsal scales larger than laterals and numbering from 29 to 33 across the midbody. Minimal pectination of toes with only a single keel on the subdigital lamellae.

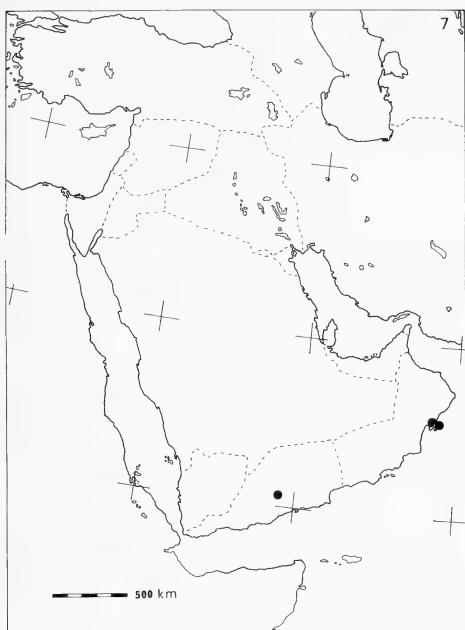
#### **Distribution**

To this date, *A. masirae* is known only to exist in Masirah Island, Jazirat Shaghaf (Oman) and Qarm Shaibah (Hadramaut).

#### **Discussion**

*A. masirae* is more clearly related to *A. opheodurus*, *A. yemenicus*, and *A. felicis* than it is to *A. boskianus* and *A. schreiberi*. For this reason we include it in the group formed by the first three even though it presents more specialized characters.

*A. masirae* stands out for its pointed snout, its subocular in contact with the lip, and its four series of scales on the fingers. Its adaptation to sandy areas makes it superficially similar to the species of the *cantorius* group. Its reduced color pattern reminds us of *A. opheodurus*.



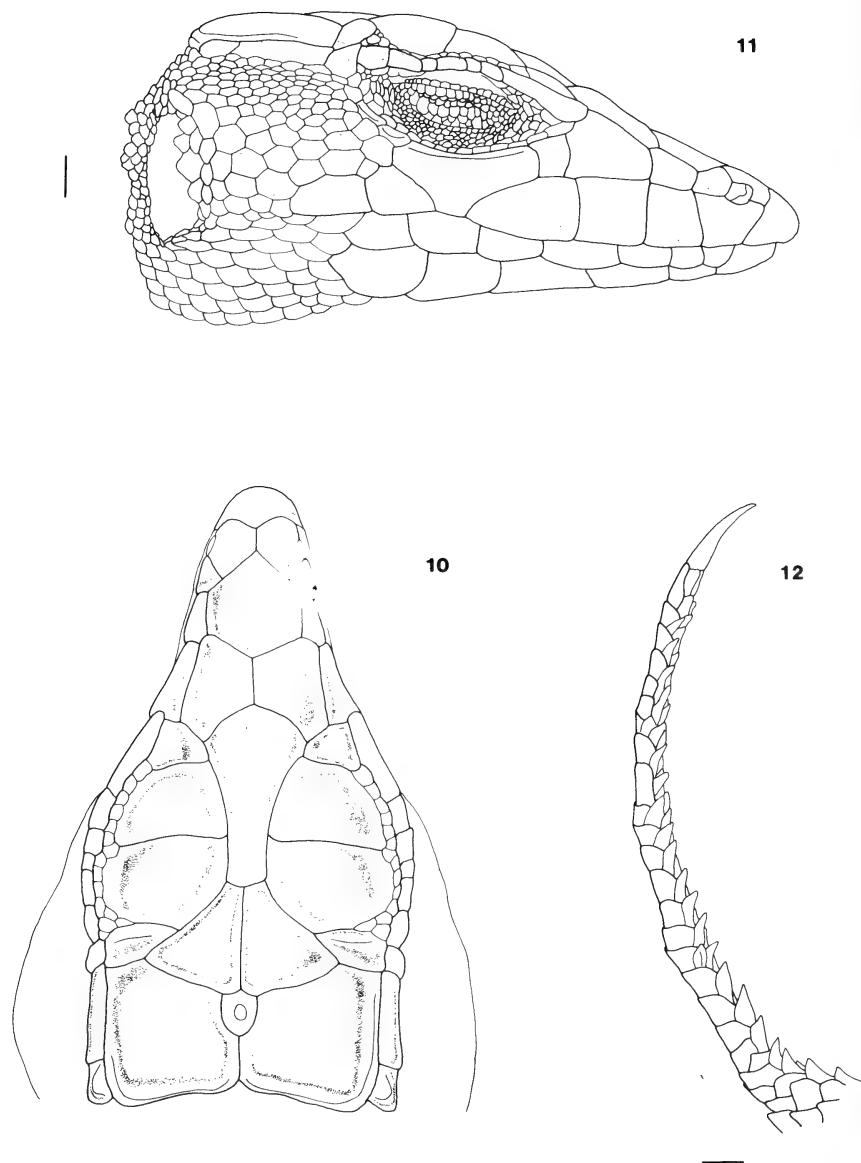
Map 7. Distribution of *A. masirae*.

### Description

*A. masirae* is a small species having a moderately flattened body with relatively long toes. The head is characterized by a posterior rounding and by a narrow pointed snout. The lanceolate concavity extending from the frontonasal to the middle of the frontal is not very pronounced. Nasals are raised with the nostril lying to the side. Developed nasal scale. The supraocular region is raised. There are four large supraoculars and 6 to 7 superciliaries with a row of granules lying between the two. There are two supratemporals. The posterior one is smaller but both have a very distinct longitudinal keel.

The small granular temporal scales have no keels. The large ear opening is slightly denticulated anteriorly by 3 or 4 pointed scales. The borders of the eyelids are pectinate with the lower lid displaying large scales. The subocular, displaying a very obvious keel, borders the orbit and is in contact with the upper lip. There are four supralabials lying anterior to the subocular. The first three of the five pairs of submaxillaries make contact along the center.

The gular scales numbering 29 to 33 down the center are more or less imbricate. There is no gular fold present. The collar is angular and made up of 10 to 11 scales. The ventrals are arranged in 10 straight longitudinal rows. The flat, keeled dorsal scales ranging from 34 to 37 across the midbody are larger than the laterals. There are 20 to 22 femoral pores on each side of the body arranged in one row intersected at the center point by a scale.



Figs. 10—12. *A. masirae*. Jazirat Shaghaf, near Masirah Island, Oman. BM 1975.1039.

There is little pectination of the toes and on the underside of the fourth one there are 23 to 24 lamellae each with a central longitudinal keel. There are four series of scales on the fingers. The scales on the upperside of the tail are medium-sized and keeled.

**Color pattern.** In adult specimens, the upper surfaces are a uniform lead gray while the limbs present an irregular reticulation. Both the snout and the sides of the head are chalky white. The underside of the body is immaculate. Young specimens are chalky white with a blue tail. Anteriorly, there are two vertebral bands which become one in the center and continues to extend to the insertion of the tail. There is a parietal band on each side which blends into the sides of the tail. In total, there are five bands in the posterior section. The legs are reticulate with large ocelli.

### Specimens examined

#### Oman

Jazirat Shaghaf, near Masirah Island ( $20^{\circ}28'N$ ,  $58^{\circ}45'E$ ), BM 1975.1039, 1976.1465.  
North Point, Masirah Island, BM 1975.2095—6, BM 1975.1226 (holotype).

#### South Yemen

Qarm Shaibah ( $14^{\circ}56'N$ ,  $48^{\circ}58'E$ ), 2000', Hadramaut, BM 1930.6.30.14.

### *Acanthodactylus opheodurus Arnold*

*Acanthodactylus opheodurus* Arnold, 1980: 296, pls. 17 (p. 317), D (p. 296), C (p. 295). Type locality: "Jazir coast ( $18^{\circ}40'N$   $16^{\circ}40'E$ ), Sultanate of Oman". Holotype, BM 1969.314.

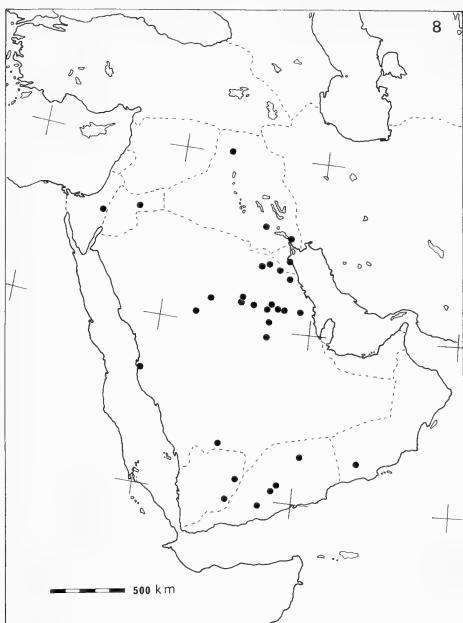
### Diagnosis

Small species with a wide head and a short snout. Rounded and protruding nasals. Four supraoculars. One row of granules between the superciliaries and the supraoculars. Very conspicuous subocular keel. Keeled temporal scales. Large ear opening bordered anteriorly by 3 or 4 scales.

Intensely pectinate eyelids. Small tympanic present. Subocular separated from the lip and wedged between the 4th and 5th supralabial. Ventrals arranged in 10 straight longitudinal rows. Flat, keeled dorsals much larger than laterals, numbering from 29 to 36 across the middle of the body. Intense pectination of toes. Three rows of scales on fingers. Large, keeled scales on the upperside of the tail. Color pattern with three dark dorsal bands.

### Distribution

This species occurs over a large area which includes Saudi Arabia, Oman, South Yemen, Kuwait, Iraq, Jordan, and Israel.



Map 8. Distribution of *A. opheodurus*.

## Discussion

Because of its superficial likeness with *A. boskianus*, this species has often been confused and disguised. Both these species are found uniformly distributed in sympatry throughout a large part of Arabia. *A. opheodurus* is easily distinguished by the reduced color pattern on its back. Two other characteristics which further differentiate it from *A. boskianus* are its short wide head and its sharply pectinate eyelids. The number of dorsal scales in *A. opheodurus* varies from 29 to 36 while for the majority of *A. boskianus* arabian populations it varies from 19 to 25.

*A. opheodurus* is directly related to *A. yemenicus* and to *A. felicis* from southern Arabia. It seems these last two species represent isolated forms now differentiated in the southern part of the peninsula but once descended from a more general ancestor whom I have identified as *A. opheodurus*. The color pattern of *A. opheodurus* easily distinguishes it from these other two. The number of longitudinal rows of ventrals is the same for both *A. opheodurus* and *A. yemenicus* whereas *A. felicis* has two less. *A. felicis* can also be recognized by its granular, unkeeled temporal scales, its large scales on the lower eyelid, its number of dorsal scales ranging from 36 to 42 and its relatively long toes with only scarce pectination.

*A. yemenicus* is characterized by much smaller dorsal scales numbering from 34 to 57, by medium-sized scales on the lower eyelid, by lightly keeled temporals, and by relatively small toes with scarce pectination. *A. opheodurus*, however, presents fully keeled temporals and both intensely pectinate eyelids and toes.

### Description

This small species is characterized by a wide head and a short snout. The lanceolate concavity running from the frontonasal to the middle of the frontal is only moderately conspicuous. The nasals are very prominent and rounded with the nostrils lying in a dorso-lateral position and tilted forward. The nasal scale is developed.

The supraocular region is raised with there being four supraoculars, the first and fourth, at times, divided. There is a row of granules between the supraoculars and the superciliaries, which range from 4 to 7. There are two supratemporals. The second is much smaller and both have a very conspicuous longitudinal central keel. The temporal scales are keeled. The large ear opening is bordered anteriorly by 3 or 4 pointed scales. The eyelids are strongly pectinate.

The lower lid is covered with medium-sized scales. Although small, a tympanic scale is present. The subocular with a very conspicuous keel bordering the orbit is separated from the lip and wedged between the 4th and 5th supralabial. Four supralabials lie anterior to the subocular. The first three of the five pairs of submaxillaries make contact in the center. The gulars, which number 26 to 31 down the center, are imbricate and a gular fold is distinguishable.

The ventrals are arranged in 10 straight longitudinal rows. The flat, keeled dorsal scales are much larger than the laterals and number from 29 to 36 at midbody. There are 17 to 22 femoral pores on each side running in one continuous row or intersected by one scale at the center point. The toes display intense pectination and on the underside of the fourth one there are 19 to 22 lamellae each with one or two keels. There are three rows of scales on all of the fingers except on the smallest which has four rows. The scales on the upper surface of the tail are large and keeled.

**Color pattern.** This species is characterized by an overall sandy-gray coloring with three very conspicuous dorsal bands and one very reticulate band along the sides.

### Specimens examined

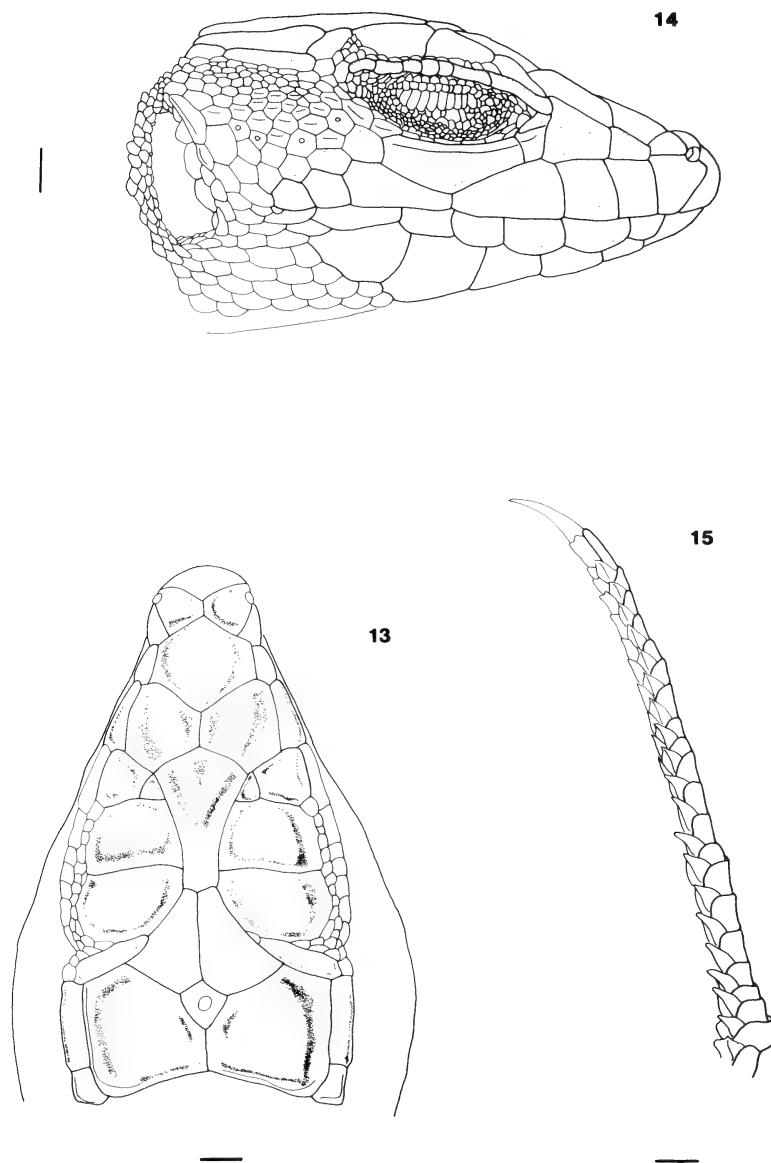
#### Saudi Arabia

28°50'N, 48°00'E, BM 1964.97.

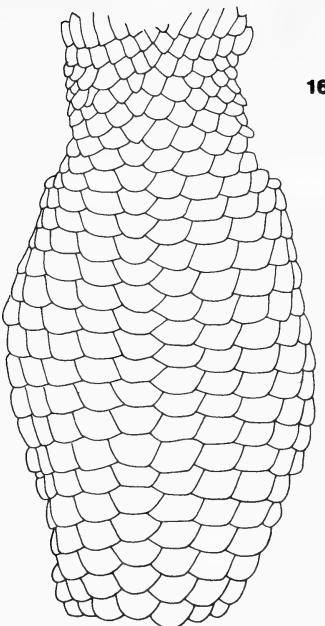
Bir Shari (27°15'N, 43°27'E), near Bu'radeha, BM 1963.767.

Lower Wadi, Nejran (17°33'N, 45°00'E), BM 1963.771.

Jawad Khan, 100 mi. W. of Hofuf, BM 1947.3.2.19.



Figs. 13—16. *A. opheodurus*. 16 km. S of Thumrait, Dhofar, Oman. BM 1977.1156.



Maagala (26°27'N, 47°17'E), BM 1964.91—92.

Royal Saudi Navy, Reservation south of Jiddah (in area 21°07'—21°21'N, from coast to 6 km. inland), CAS 136509—10.

26°25'N, 46°45'E, BM 1964.102.

6 km. SE of Ad-Dabtiyah, BM 1971.1346.

Jabbal Shammar (27°20'N, 41°45'E), BM 1963.765.

26°18'N, 47°56'E, BM 1970.343.

27°12'N, 43°55'E, BM 1964.100—1.

28°30'N, 47°30'E, BM 1964.96.

Jafura (24°14'N, 50°00'E), BM 1924.11.18.8.

Quariya (27°33'N, 47°40'E), BM 1964.93—4.

Near Bureida, BM 1963.768.

Tanki (25°30'N, 46°45'E), BM 1964.89.

National Guard, 25 km W of Riyadd, BM 1974.4136.

49°23'E, 25°55'N, BM 1976.1706.

Hejaz (24°30'N, 38°30'E), BM 1938.21.54—6.

28°30'N, 46°00'E, BM 1964.103—7.

#### Oman

16 km S of Thumrait, Dhofar, BM 1977.1155—60.

Jazir coast, BM 1969.314 (holotype), 1969.315.

**South Yemen**

Ghondha, Hadramaut, BM 1956.1.7.66.  
 Hadramaut, BM 97.3.11.66—70.  
 Wadi Na'ga (17°34'N, 50°40'E), Hadramaut, BM 1956.1.7.65.  
 E of Aden, BM 1957.1.15.36—37.  
 Wadi Jardan (15°02'N, 45°36'E), near Ayadh, BM 1957.1.15.39—40.  
 Wadi Ain (15°00'N, 48°40'E), Hadramaut, BM 1956.1.7.67.  
 Harib (15°30'N, 45°58'E), BM 1963.777.  
 Shabwa (15°22'N, 47°01'E), E of Aden, BM 1957.1.15.38.  
 Seyun (15°56'N, 48°47'E), Wadi Hadramaut, BM 1953.1.7.28.

**Kuwait**

Kuwait, BM 1972.360, 1973.101(3).  
 City of Kuwait (29°20'N, 47°59'E), BM 1970.1927.  
 Near Hail, BM 1963.763.

**Iraq**

Basra (30°30'N, 47°47'E), BM 1919.12.19.2—3.  
 SW of Zubair, BM 1975.1198—9.  
 Ash Sharqat, Ninevah (35°27'N, 43°16'E), BMI 433.

**Jordan**

Tell Qarma (31°47'N, 37°11'E), BM 1965.691.

**Israel**

Wadi Araba (30°58'N, 35°24'E), FMNH 48486.  
 Wadi Minaye, BM 1952.1.4.71.

### ***Acanthodactylus felicis* Arnold**

*Acanthodactylus felicis* Arnold, 1980: 300, pls. 18 (p. 317), E (p. 303), C (p. 295). Type locality: "Hadramaut", Republic of South Yemen". Holotype, BM 97.3.11.65.

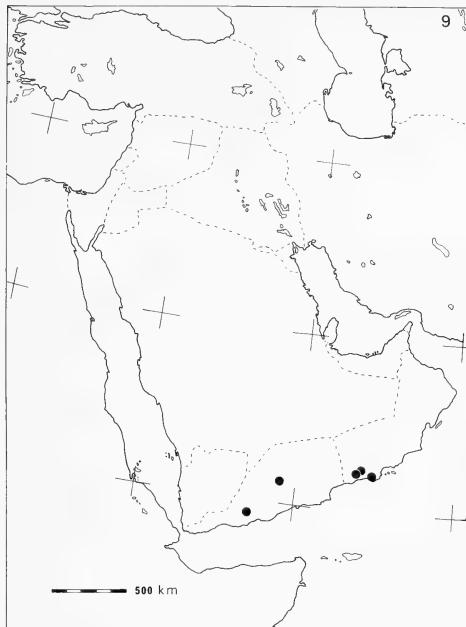
### **Diagnosis**

Medium-small species. Short snout. Toes relatively very long. Four supraoculars. One row of granules between the supraoculars and the superciliaries. Small granular temporals without keels. Large ear opening slightly denticulated anteriorly by two or three scales. Moderately pectinate border of eyelid and large scales covering lower lid. Subocular separated from the lip and wedged between the fourth and fifth supralabial.

Ventrals arranged in 8 straight longitudinal rows. Dorsal scales larger than laterals, numbering from 36 to 42. Scant pectination of toes. Three series of scales on fingers.

### **Distribution**

*A. felicis* is known from only various sites in Dhofar (Oman), from Mahfud in Yemen, and between Bai and Salalah.



Map 9. Distribution of *A. felicis*.

## Discussion

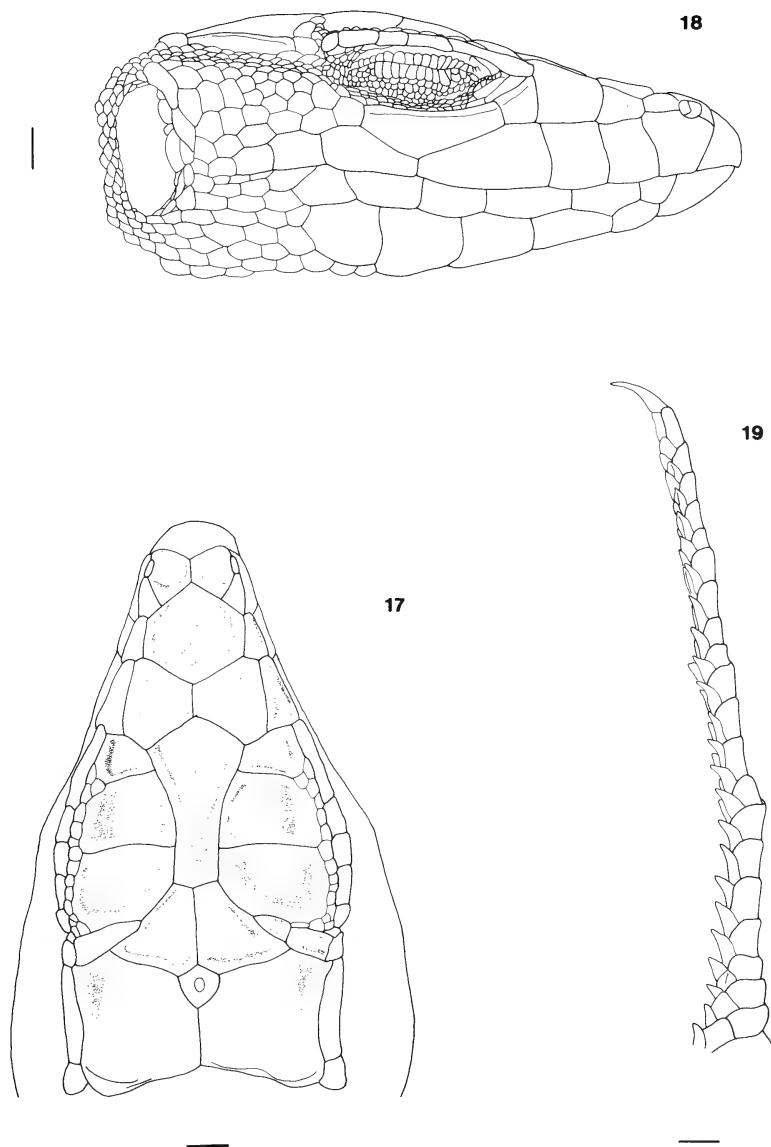
See discussion of *A. yemenicus*.

## Description

This medium-small species is characterized by a slender body, especially long toes, and a short snout. The lanceolate concavity is only moderately distinguishable and lies between the frontonasal and the middle of the frontal. The nasals protrude slightly while the nostril is partially lateralized. The nasal scale is developed. The supraocular region is moderately raised with there being four supraoculars present, the fourth, sometimes, divided in two. A row of granules lies between the supraoculars and the five or six superciliaries.

There are two supratemporals with the posterior one being very small. Both have a very conspicuous longitudinal central keel. The temporal scales are small and granular and have no keels. The large ear opening is only scantily denticulated anteriorly by 2 or 3 scales. The edge of the eyelid is moderately pectinate and the lower lid is covered with large scales. Although small, a tympanic scale is present.

The subocular, separated from the lip and wedged between the fourth and fifth supralabial, has a distinctly visible keel bordering the orbit. There are four supralabials lying anterior to the subocular. The first three of the five pairs of



Figs. 17—19. *A. felicis*. Wadi Ayun, Dhofar, Oman. BM 1977.1143.

submaxillaries make contact along the center. The gular scales are imbricate in the anterior and posterior portions of the gular region while granular in the central portion. They number from 26 to 33 down the center. A gular fold is distinguishable. The collar is rounded and formed by 6 to 11 scales. The ventrals are arranged in 8 straight longitudinal rows.

Ranging from 36 to 42 across the middle of the body, the dorsal scales are keeled and are larger than the laterals. There are 18 to 25 femoral pores on each side on the body running in one continuous row or separated at the center point by one scale. The toes are barely pectinate. Under the fourth one, there are 20 to 25 lamellae with one or two keels each. The fingers display three rows of scales. The scales on the upperside of the tail are large and keeled.

Color pattern. The general overall coloration is a gray-brown. On each side of the body there is one dark fragmented parietal band which join together at the tail and one dark reticulate temporal band. Gray reticulate and white ocelli cover the limbs while the digits are completely white. The undersides are immaculate. Young specimens have a thin black vertebral band with a thick dark parietal band to each side.

Along the side of the body there is a thick temporal band with another smaller one below it. In total, there are seven black bands and six white ones at mid-body.

### **Specimens examined**

#### **Oman**

Wadi Ayun ( $17^{\circ}15'N$ ,  $53^{\circ}53'E$ ), 7 km. E of Wadi Ayun Poolr, Dhofar, BM 1977.1142—7.

Wadi Anshayr, E of Mirbat ( $17^{\circ}00'N$ ,  $54^{\circ}45'E$ ), Dhofar, BM 1977.1148—50.

49 km. towards Thumrait, on road from Salalah, Dhofar, BM 1977.1154.

#### **South Yemen**

Mahfad ( $14^{\circ}03'N$ ,  $46^{\circ}55'E$ ), BM 1963.782.

Hadramaut, BM 97.3.11.65 (holotype).

#### **Dhofar—Hadramaut**

Between Bai and Salalah, BM 1974.4040—1.

### ***Acanthodactylus yemenicus* n.sp.**

**Holotype**, FMNH 66510 (HH Field Series No. 4894). Ta'izz, Yemen. H. Hoogstral coll.

**Paratypes**, all specimens included in the examined material list.

### **Diagnosis**

Short snout. Four entire supraoculars. One row of granules between the supraoculars and the superciliaries. Lightly keeled temporals. Large ear opening

slightly denticulated anteriorly by 4 or 5 scales. Moderately pectinate eyelid. Medium-sized scales on the lower lid. Sharply keeled tympanic scale present. Subocular separated from the lip and lodged between the fourth and fifth supralabial.

Distinguishable gular fold. Ventrals arranged in 10 straight longitudinal rows. Small flat dorsals lightly keeled and numbering 34 to 57 across the middle of the body. Toes with scant pectination. Three rows of scales on fingers. Large and distinctly keeled scales on the upper side of the tail.

### **Distribution**

This species occurs in the mountains of Yemen at Ta'izz and Usaifira and along the coast at Aden and Scheikh Othman.

### **Discussion**

*A. yemenicus* is closely related to *A. felicis* from Oman and eastern Yemen. Both appear to be isolated mountain forms descended from a common ancestor with *A. opheodurus*. The most obvious character which distinguishes one from the other is the number of longitudinal rows of ventrals. *A. yemenicus* has 10 whereas *A. felicis* has only eight. The *A. felicis* sample found in close geographic proximity to *A. yemenicus* has precisely only six rows of ventrals. This could be interpreted as an apparent case of character displacement in related species in sympatry.

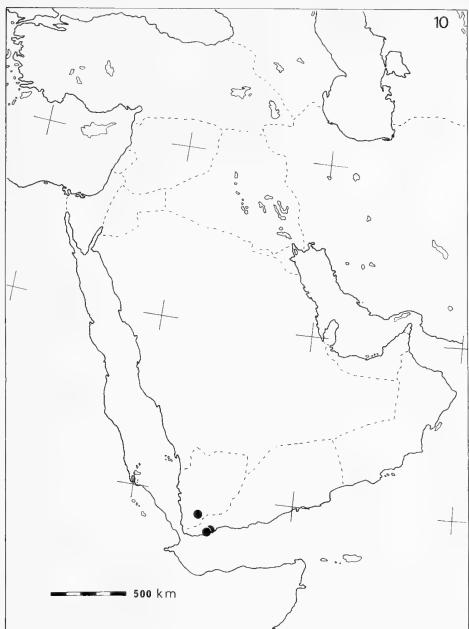
Other characters which separate the two forms are the different color patterns, the high number of weakly keeled dorsals in *yemenicus*, the smooth granular temporal scales in *A. felicis*, the medium-sized scales on the lower lid in *yemenicus*, and the relatively long toes of *A. felicis*.

In order to better determine the relationship between these two forms, however, it is necessary to examine more material from the intermediate zones. We should then be able to determine if they are completely isolated from each other or if, instead, they are found in sympatry and how they vary within this area.

### **Description**

*A. yemenicus* is characterized by a medium-sized body, a short snout, and relatively short toes. The lanceolate concavity extending from the frontonasal to the middle of the frontal is easily recognizable. The nasals protrude while the nostril lies in a latero-dorsal position. The nasal scale is developed. The supraocular region is moderately raised with there being four entire supraoculars, the fourth one, at times, divided.

There is one row of granules between the supraoculars and the superciliaries, which in turn number from 6 to 7. The posterior supratemporal is a little small-



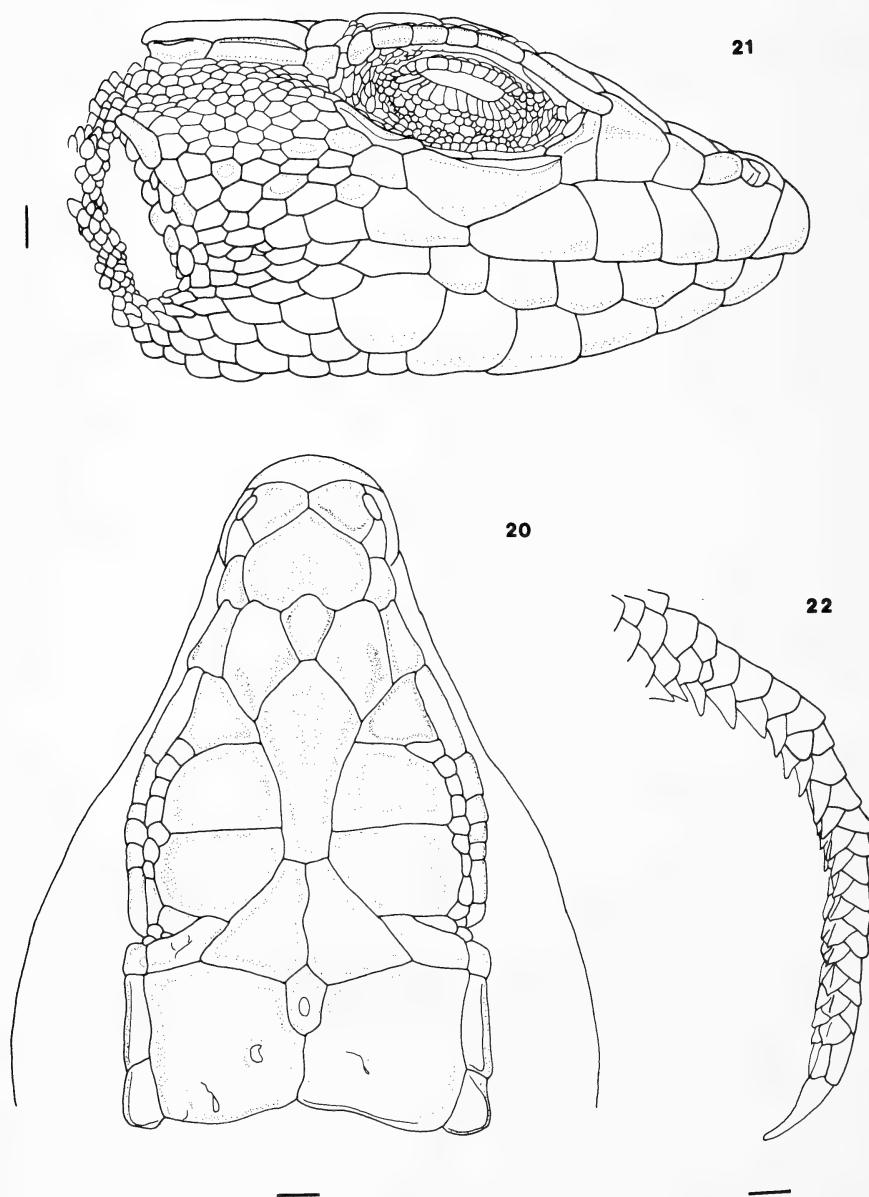
Map 10. Distribution of *A. yemenicus* n.sp.

er than the anterior one. Both display a distinct longitudinal central keel. The temporal scales are small, granular and only lightly keeled. The large ear opening is barely denticulated anteriorly by 4 or 5 scales. The border of the eyelid is moderately pectinate while medium-sized scales cover the lower lid.

A sharply keeled tympanic scale is present. The subocular with a well-developed keel bordering the orbit is separated from the lip and wedged between the 4th and 5th supralabial. There are four supralabials lying anterior to the subocular. The first three of the five pairs of submaxillaries make contact along the center. The gular scales are large and imbricate numbering from 22 to 29 down the center. A gular fold is distinguishable. The collar is rounded and made up of 7 to 10 scales.

The ventrals are arranged in 10 straight longitudinal rows. The dorsals, which are small, flat and moderately keeled, are a little larger than the laterals and range from 42 to 57 across the middle of the body. There are 15 to 21 femoral pores on each side which are arranged in a row intersected at the center point by two scales. The toes are only scantily pectinate. Under the fourth one, there are 18 to 22 bicarinate lamellae. There are three series of scales on the fingers. The upperside of the tail is covered with large, sharply keeled scales.

**Color pattern.** The overall coloration is a gray-brown. There are two whitish gray parietal stripes which join upon reaching the tail. Outside of them, faint



Figs. 20—22. *A. yemenicus* n. sp. Ta'izz, Yemen. FMNH 66510(4911).

traces of a dark band can be seen. There are no appreciable bands along the sides of the body. The limbs are lead gray with very diffused pale ocelli.

### **Variation**

The samples from Ta'izz are quite uniform except for their coloration. Some have practically no pattern at all with the gray stripes only barely noticeable. Others having a more conspicuous pattern display two occipital bands which join at midbody, a diffused reticulate one along each side of the body, and, most outstanding of all, a stair-shaped parietal band on each side.

In the young, there are six white stripes and seven dark bands in the center of the body. On the neck, there are two white occipital stripes which become one and disappear before reaching midbody. Conspicuous white flecks are scattered on the dark bands. The limbs are reticulate with distinct ocelli. In the specimens from Aden (FMNH 18222) the parietal band is more conspicuous and the dorsal scales are larger and more keeled numbering from 37 to 41 at midbody. The specimens from Sheikh Othman (NHW 11796) have both a larger head and body with 34 to 40 dorsal scales at midbody.

### **Specimens examined**

#### **Yemen**

Ta'izz (13°34'N, 44°02'E), FMNH 66509(7), 66510(44), 66511(5), 66512(3), 66514(16).

Usaifira (13°34'N, 44°02'E), 4100', FMNH 66508.

#### **South Yemen**

Aden (12°46'N, 45°01'E), FMNH 18222(4).

Scheikh Othman (12°52'N, 44°59'E), NHW 11796(4).

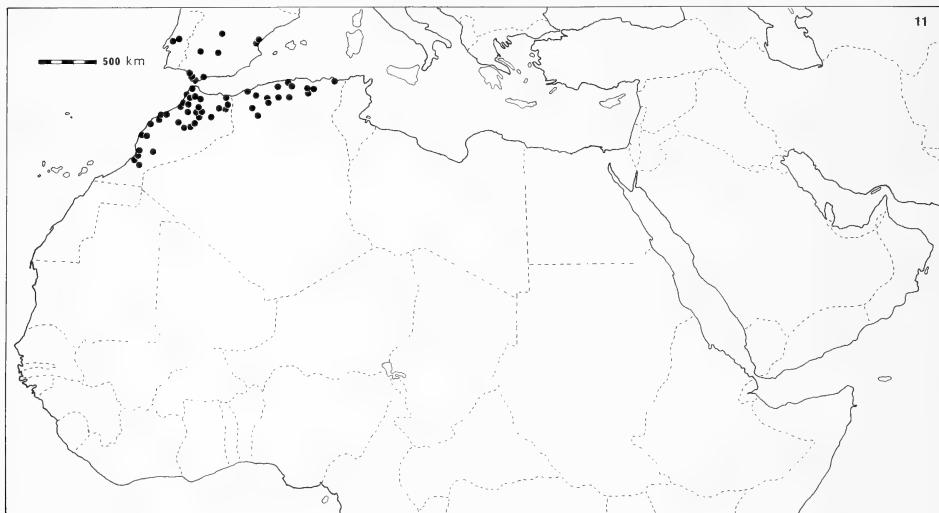
### ***Acanthodactylus erythrurus* (Schinz)**

### **Diagnosis**

Medium-sized species. Two large supraoculars corresponding to the second and the third. One, rarely two, row of granules between the supraoculars and the superciliaries. Four supralabials anterior to the subocular. Ear opening and eyelids lacking pectination. Small dorsal scales either smooth or weakly keeled. 10 straight longitudinal rows of ventrals. Fingers with three series of scales. Fourth toe only slightly pectinate. Red tail in both young and females.

### **Distribution**

*A. erythrurus* occurs on the Iberian peninsula and in northwestern Africa. The distribution on the Iberian peninsula generally includes all of the southern and central regions and excludes northern Portugal, Galicia, the Cantabrian



Map 11. Distribution of *A. erythrurus*.

Mts., the Basque Country, the Pyrenees, and Catalonia. In Morocco, *A. erythrurus* thrives on the western plains stretching from Agadir on the south to Tangier, in the Atlas Mts., and on the eastern plateaux. In Algeria, it is found in the coastal regions along side *A. savignyi* and on the high plateaux. From a biological and ecological standpoint, *A. erythrurus* has been studied more than any other species of the genus. Its biology has been examined in detail in the outskirts of Rabat (Bons, N., 1962, 1963, 1965, 1968, 1969, 1972, 1973) and Wijffels (1963) published some field notes for the species in Spain. Busack (1976) made a more detailed study for the species in La Algaida, Cádiz.

## Discussion

The last study of the systematics of *A. erythrurus* was made by Boulenger (1921). Therein, he differentiated the Iberian type-form, *belli* from the Algerian coasts and plateaux, *atlanticus* from the Moroccan Atlas Mts., *mauritanicus* from Oran, and *lineomaculatus* from Mogador. An examination of extensive collections from the entire area of distribution leads us to reduce the number of forms to three.

The type-form would be that of the Iberian peninsula while the other two would be *lineomaculatus* found on the western plains of Morocco and *belli* found on the eastern plateaux of Morocco and in Algeria. Although the type-specimens for *tingitanus* have been lost, we can safely conclude its synonymy with *lineomaculatus*. Upon examining the type-specimens of *mauritanicus* from Oran (BM 1946.9.3-6), we find that they do not differ from *belli*.

The subspecies *atlanticus*, proper to the Atlas Mts. in Morocco and characterized by a small scale separating the subocular from the mouth, should simply be considered an intermediate population between *belli* and *lineomaculatus*. The type-specimens, along with other specimens from the area, have the same color pattern, coloration, and size as *belli* while the subocular scale varies greatly within and among individuals. Likewise, the *ksourensis* form (the type-specimen has been lost as it no longer appears in either the Paris nor London Museum) is nothing more than a variant of *belli*.

### ***Acanthodactylus erythrurus erythrurus* (Schinz)**

*Lacerta erythrura* Schinz, 1833: 102, Taf. 38. Type locality: "Spanien". Holotype, not located.

*Acanthodactylus vulgaris* Duméril & Bibron, 1839: 268. Type locality: "Midi de la France, L'Italie et l'Espagne". Restricted to "Süd-Spanien" by Mertens & Wermuth (1960: 96). Holotype, not located.

*Acanthodactylus vulgaris* subsp. *bocagei* Ferreira, 1892: 194. Type locality: "Portugal". Holotype, Museo Bocage. Presumably destroyed during the 1978 fire.

### **Diagnosis**

Flat dorsal scales. Subocular either in contact or not with lip. Adults lacking blue spots along sides of body.

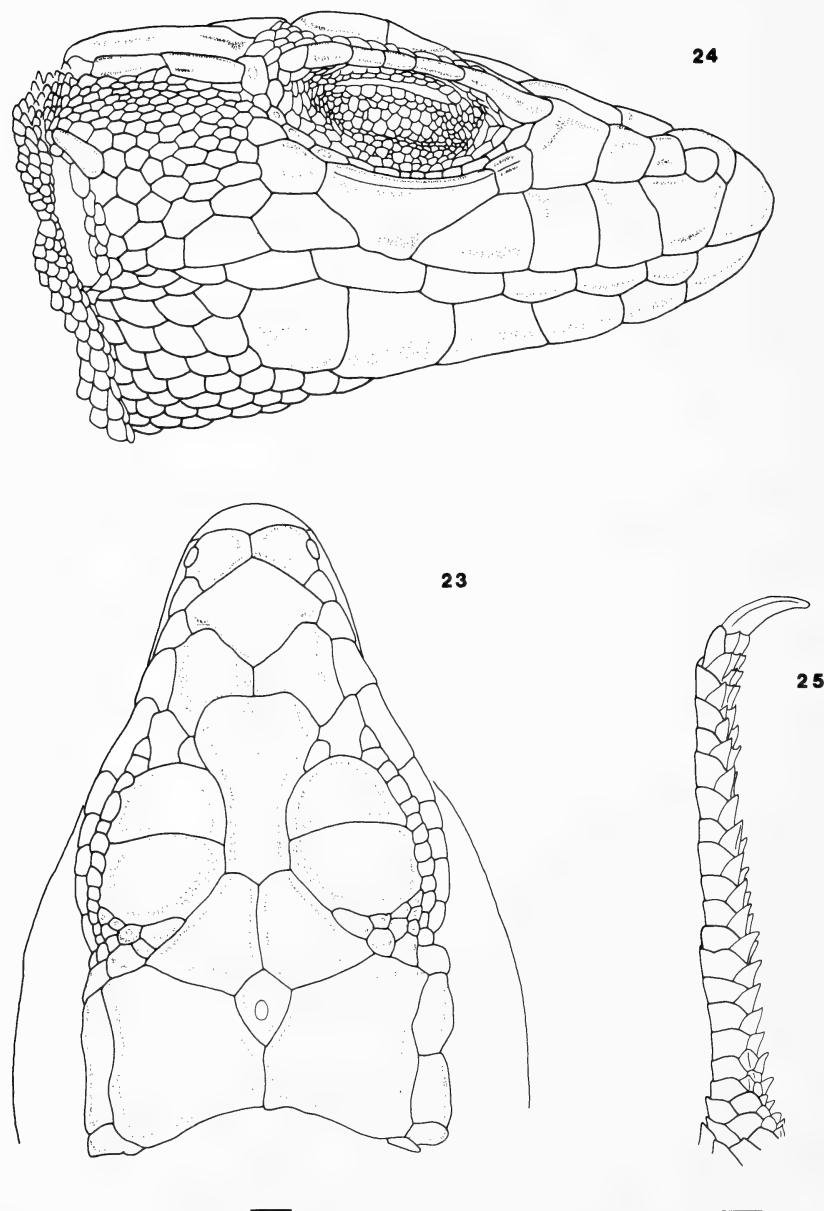
### **Distribution**

Boulenger (1921) reported this subspecies to occur in León, New Castile, Old Castile, Levante, Murcia, and Andalusia and in Portugal in Estremadura and Algarve. It is commonly found in open fields and sandy areas at low to medium altitude. *A. e. erythrurus* is not found in Catalonia. It should also be pointed out that the french localities cited in the past for this form have proven to be erroneous and should, therefore, be rejected. Recently Busack (1977) studied this subspecies' distribution and zoogeography in the province of Cadiz. Salvador (1981) summarizes literature records from Spain and Portugal.

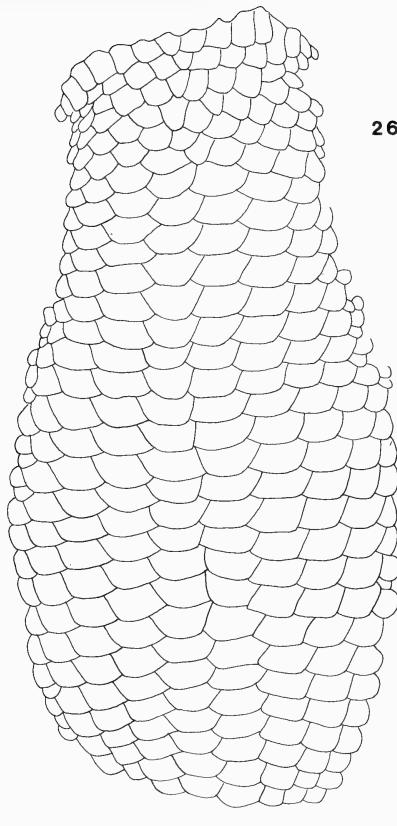
### **Description**

This subspecies is characterized by a medium-sized robust body. A lanceolate concavity extending from the frontonasal to the middle of the frontal is present. The snout is bluntly pointed with a slightly conspicuous concave cavity in the loreal region. The tail is very thick at its base. The frontonasal is wider than it is long while the prefrontals are longer than they are wide. The outside edge of the parietals is either straight or concave.

There are two large supraoculars corresponding to the second and the third. The first and fourth have been divided into small granules. Although at times two may be present, there is generally only one row of granules between the



Figs. 23—26. *A. erythrurus belli*. 15 km NW of Mechra Saf-Saf, Morocco. BM 1970.243.



supraoculars and the superciliaries. There are 6 to 8 supraciliary granules with the first being the largest. The anterior loreal scale is a little larger than the posterior one. Four supralabials lie anterior to the subocular, which in turn has a very prominent keel bordering the orbit.

There are one or two supratemporals lying between the temporal region and the parietal scale. The temporal region is made up of small scales either smooth or barely keeled. A small tympanic shield is present. There is an absence of denticulation on the anterior portion of the ear opening. There are usually five pairs of submaxillaries with the first three in contact. The gular scales, numbering from 26 to 36 in a straight line running from the collar to the symphysis of the submaxillaries, are granular in the anterior region and slightly imbricate towards the neck.

A gular fold is absent. The collar is either angular or rounded and formed by 8 to 12 scales. The neck area is covered with granular scalation. The dorsals are rounded and flat and number from 55 to 70 across the middle of the body. The scales on the upperside of the tail are very large and keeled. The ventrals are arranged in both straight longitudinal and transverse rows with the longitudinal ones normally numbering 10. The femoral pores run in one continuous row across the body with 20 to 28 on each side. There are three series of scales on the fingers.

There are 20 to 26 lamellae each with one to three carinae underneath the fourth toe, which is only slightly pectinate.

**Color pattern.** Young specimens are striated with black and yellow and have a red tail. There are five yellow-white bands along the back and two on each side. There is a series of yellow-white spots on the black bands along the side. In adults, the black bands are instead a gray-brown and are either reticulate or spotted. The limbs are covered with abundant white ocelli. Adult coloration varies greatly among individuals. In the Iberian populations a type of geographical variation consisting of the near disappearance of color pattern in the Levante populations is evident. These specimens are very pale and grayish. This is similar to what happens to *Lacerta lepida* in the same zone.

### Specimens examined

#### Portugal

Pinhal do Rei, Estremadura, KU 148635.

Algueirao (38°48'N, 9°20'W), KU 144257.

Abrantes (39°28'N, 8°12'W), BM 87.3.29.8.

Fonte da Telha (38°34'N, 9°12'W), 15 km. S of Lisbon, MNHNP 1970.1216—23.

#### Spain

La Algaida, 4.9 mi. near Bonanza, CM 53438(25), 53425(26), 53397(30), 53383(18), 53378, 53373(21), UCM 44974—9.

La Algaida, 4.3 mi. from Bonanza, CM 53245(29).

La Algaida, 4.1 mi. N of Bonanza, CM 54218—20, 53916(23), 53888—90, 53896(25), 53885(12), 53471(13), 53333(14), 53282—8.

La Algaida, CM 55699—701, 55659(22), 55474(32), 55340—1, 55337—9, 55330, 55305—28, 54873(29), 54794(26), 54789(30), 54676(38), 54594(12), 54592(19), 54565(6), 54561, 54277(3), 54255—7, 54223(12), 53350(14).

4.7 mi. E of La Barca de la Florida, on highway CA-502, CM 51090—2.

4.9 mi. E of La Barca de la Florida, on Highway CA-502, CM 53046(10), 52176—8, 51936—40, 51924—9, 51347—8, 51334—7, 51327—9, 51119—20, 51107—10, 51098—100.

Rota, CM 53364(8), LACM 113879, BM 1975.1257—9.

Rota, beaches to the W, CM 54279, 53372.

Rota Naval Base, near the harbor, CM 50949.

Rota Naval Base, CM 54844, 53256.

Barbate de Franco, vic., W on road to Cabo Trafalgar, CM 55483—6.

Barbate de Franco, vic., W along coastal dirt road, CM 55451(14).

Puerto Real, vic., eastward, CM 54834(13).

Punta Paloma, Cádiz, USNM 193118(7).

Vic. of Punta Paloma, CM 53346(15).

Trafalgar ( $36^{\circ}11'N$ ,  $6^{\circ}02'W$ ), MVZ 128231.  
 2 mi. E of Cape Trafalgar, CM 55482, 55480—1.  
 La Algaida, near Bonanza, BM 1962.446—55.  
 4 km E of Estepona, Málaga, BM 1962.456—7.  
 Valencia, BM 1920.1.20.728, 86.12.29.27—34, 1920.1.20.384.  
 Dehesa de la Albufera, Valencia, BM 1920.1.20.3004, MCZ 17468—9.  
 Zaragoza, ZFMK 22697—715.  
 Tabernes de Valldigna ( $39^{\circ}04'N$ ,  $0^{\circ}16'W$ ), BM 76.2.28.9—11, 76.2.28.3.  
 Ciudad Real, BM 1920.1.20.383.  
 35 km. N Madrid, ZFMK 22687—96.  
 Don Benito, Badajoz, BM 1920.1.20.382.  
 Salamanca, ZFMK 22679—86.  
 Manzanares el Real, Madrid, CM 60884.  
 Valencia beach, MCZ 15701—2, UMMZ 57005.  
 Béjar, Salamanca, ZFMK 22671—5.  
 Langunilla, Béjar, Salamanca, ZFMK 22676—8.

### ***Acanthodactylus erythrurus lineomaculatus* (Duméril & Bibron)**

*Acanthodactylus lineomaculatus* Duméril & Bibron, 1839: 276. Type locality: “Mogador”.  
 Boulenger (1921) examined 10 syntypes in the Paris Museum but I was unable to locate them. Perhaps MHN 5912 from Mogador belongs to this series.  
*Acanthodactylus vulgaris* var. *tingitanus* Doumergue, 1901: 187, pl. xiv, figs. 1—7. Type locality: “Tanger, Larache”. Holotype, not located.

### **Diagnosis**

Flat, keeled dorsal scales. Lack of subocular contact with the upper lip.  
 Series of blue ocelli on each side of the body.

### **Distribution**

This subspecies is found on the western plains of Morocco extending from the Tangiers area to the extreme south and from the coast to the Atlas Mts.

### **Specimens examined**

#### **Morocco**

Ouieuane ( $30^{\circ}09'N$ ,  $7^{\circ}42'W$ ), 80 km. SW of Azrou, 4500', BM 1934.12.3.52.  
 Ayachi Valley, SW of Midelt, BM 1934.12.3.65.  
 Al Hoceima ( $35^{\circ}15'N$ ,  $3^{\circ}56'W$ ), BM 1974.449—50.  
 Mogador (Essaouira), BM 1907.6.22.20, 1907.6.22.11—19, MHN 5912, MCZ 25141,  
 27392, 31444.  
 Tanger, BM 1966.427—30, 86.12.18.7—11, 1920.1.20.3394, 48.2.16.4, 95.3.21.1,  
 1920.1.20.380, FMNH 67015, 67017—20, ZFMK 21266.  
 Cape Cantin ( $32^{\circ}35'N$ ,  $9^{\circ}18'W$ ), 35 km. N of Kafi, BM 1967.97—9.  
 Temara beach ( $33^{\circ}56'N$ ,  $6^{\circ}58'W$ ), 11 km. SW of Rabat, BM 1972.2308.  
 Beni Haros ( $35^{\circ}19'N$ ,  $5^{\circ}38'W$ ), MHN 1908.105.  
 SE of Diabet, near Mogador, MHN 98.110—1.  
 Vic. of Mogador, MHN 98.120(3), 98.112—6.

Kourigha (32°53'N, 6°54'W), MHNHP 1927.118.  
 Shores of Guigou at Timhoudit (33°14'N, 5°04'W), MHNHP 1927.119.  
 Khenifra (34°16'N, 6°36'W), MHNHP 1927.120.  
 Taourirt (29°39'N, 8°53'W), MHNHP 1927.121.  
 Tangier beach, MHNHP 1939.157.  
 El Mers Des Ait Leghrrouachen (32°16'N, 6°24'W), MHNHP 1927.14.  
 Cuba Hamza at Ksar el Kebir (35°00'N, 5°59'W), MHNHP 1902.205.  
 Fort Gurgeur, MHNHP 1912.472.  
 3 km. N of Settat, USNM 196428(2).  
 20 km. SE of Larache, USNM 196426.  
 5.5 mi. N of El Jadida beach, CM 55199(19), 55200—4.  
 Grottes d'Hercule (35°46'N, 5°56'W), 10 mi. W of Tangier, CAS 123207—9.  
 15 km. E of Agadir (30°24'N, 9°28'W), USNM 196427(2).  
 9 km. N of Tamri (30°20'N, 9°50'W), USNM 196429(4).  
 20 km. NE of Tiznit, LACM 108997.  
 5 mi. S of Sidi Yahia, near Tiflet river, USNM 134364.  
 Mehdia (34°15'N, 6°41'W), CAS 92442, 92461—2.  
 Oulmès (33°26'N, 6°01'W), AMNH 84181.  
 Oulmès Plateau, CAS 92443—7.  
 Mamora, near Rabat, MCZ 31442—3.  
 Casablanca, CM 25364—5, AMNH 84170—1, CAS 92441.  
 15 km. S of Casablanca, MCZ 48797.  
 Fedala (33°43'N, 7°22'W), MCZ 31445.  
 Essaouira, 3—3.6 mi. S of, CM 55205—11.  
 Tichka (21°20'N, 7°23'W), ZFMK 7085—7.

### *Acanthodactylus erythrurus belli* Gray

*Acanthodactylus belli* Gray, 1845: 36. Type locality: "Algiers". Syntypes, BM 1946.9.3.8—11.  
*Acanthodactylus vulgaris* var. *mauritanicus* Doumergue, 1901: 187, pl. xiv, figs. 1—4. Type locality: "Oran, La Sénia, Sig, Bedean, Magenta, Daya, Sidi-Chaib, Kralfallah, Sidi-Douma, Nemours, Ain-Tedeles". Restricted here to Oran. Syntypes, BM 1946.9.3.6—7 from Oran.  
*Acanthodactylus vulgaris* var. *ksourensis* Doumergue, 1901: 187, pl. xiv, fig. 7. Type locality: "Stitten". Holotype, not located.  
*Acanthodactylus vulgaris* var. *atlantica* Boulenger, 1918a: 149. Type locality: "Atlas du Maroc". Restricted here to Tamaruth Valley. Syntypes, BM 1946.9.2.72—73 (Tamaruth valley), BM 1946.9.2.71 (Atlas of Morocco).

### Diagnosis

Subocular in contact with the upper lip. Smooth or slightly keeled dorsals. Color pattern lacking lateral ocelli. Brown coloration with light gray stripes.

### Distribution

This subspecies occurs in northeastern Morocco and the coastal regions and high plateaux in Algeria. Intermediate populations with *lineomaculatus* are found in the Atlas und Rif Mts.

## Specimens examined

### Morocco

Atlas of Morocco, BM 1946.9.2.71 (syntype of *atlanticus*).  
 Tamaruth Valley, BM 1946.9.2.72—3 (syntypes of *atlanticus*).  
 20 km. S of Berguent, BM 1970.241.  
 50 km. S of Oujda, BM 1970.242.  
 15 km. NW of Mechra Saf-Saf, BM 1970.243.  
 11 km. E of Hamada of Talionine, BM 1970.244—5.  
 Gara of Debdou ( $33^{\circ}53'N$ ,  $3^{\circ}07'W$ ), MCZ 61136.  
 20 km. SE of Debdou, ZFMK 26203—4.  
 Meknes, Ifrane, AMNH 84169, MCZ 61135.  
 Oued Ifrane ( $33^{\circ}32'N$ ,  $5^{\circ}07'W$ ), 4100', UMMZ 108916(8).  
 Ifrane, ZFMK 7074—6.  
 Azrou ( $33^{\circ}26'N$ ,  $5^{\circ}13'W$ ), MCZ 31440—1, MNHNP 1925.198—201.  
 Timhadite, Azrou, ZFMK 7079—83.  
 El Ksiba ( $32^{\circ}35'N$ ,  $6^{\circ}02'W$ ), CM 55197—8, 55195—6.  
 Djebel Tazzeka ( $34^{\circ}05'N$ ,  $4^{\circ}12'W$ ), S of Taza, AMNH 84179.  
 10 km. E of Bab-Taza, CAS 92438—40.  
 Chechaouene, ZFMK 7077—8.  
 8 km. W of Chechaouene, ZFMK 18672.

### Algeria

Sebdou ( $34^{\circ}38'N$ ,  $1^{\circ}20'W$ ), BM 97.12.29.11.  
 Sersou Plateau ( $35^{\circ}30'N$ ,  $2^{\circ}00'E$ ), BM 1920.1.20.602.  
 Wed Sedeur ( $34^{\circ}57'N$ ,  $2^{\circ}36'E$ ), between Laghouat and Djelfa, BM 1920.1.20.1302A.  
 Algiers, BM 1946.9.3.8.—11 (syntypes of *belli*), MNHNP 2756(4), 2752(3).  
 Hussein Dey ( $36^{\circ}45'N$ ,  $3^{\circ}06'E$ ), near Algiers, BM 1920.1.20.1302B.  
 Maffray ( $36^{\circ}51'N$ ,  $7^{\circ}57'E$ ), near Bona, BM 1920.1.20.1302.  
 Setif ( $36^{\circ}12'N$ ,  $5^{\circ}24'E$ ), BM 1920.1.20.1302E.  
 Bordj Bou Arrerij ( $36^{\circ}04'N$ ,  $4^{\circ}46'E$ ), BM 85.4.20.2.  
 Rorfa des Beni Salam, near Aumale, BM 85.4.20.7.  
 Wed Okris ( $36^{\circ}04'N$ ,  $3^{\circ}57'E$ ), near Aumale, BM 1920.1.20.1302D.  
 El Golea ( $30^{\circ}34'N$ ,  $2^{\circ}53'E$ ), BM 1969.2120.  
 Oran, BM 1946.9.3.6—7 (syntypes of *mauritanicus*), FMNH 42827, 42829.  
 St. Denis Le Sig ( $35^{\circ}32'N$ ,  $0^{\circ}11'W$ ), near Oran, BM 1920.1.20.1302.  
 Santa Cruz ( $35^{\circ}43'N$ ,  $0^{\circ}40'W$ ), near Oran, BM 91.5.4.63—9, MCZ 28688.  
 Daya ( $34^{\circ}40'N$ ,  $0^{\circ}37'W$ ), BM 97.12.29.7—8.  
 La Senia ( $35^{\circ}39'N$ ,  $0^{\circ}38'W$ ), BM 97.12.29.9—10.  
 Kralfalla ( $34^{\circ}33'N$ ,  $0^{\circ}16'W$ ), BM 97.10.4.8.  
 Guelt-Es-Stel ( $35^{\circ}09'N$ ,  $3^{\circ}02'W$ ), BM 1912.6.8.16.  
 Crampel ( $34^{\circ}26'N$ ,  $0^{\circ}48'W$ ), MNHNP A 773.  
 La Marnia ( $34^{\circ}51'N$ ,  $1^{\circ}44'W$ ), MNHNP 1974.256.  
 Sidi Emmbarek ( $36^{\circ}12'N$ ,  $5^{\circ}24'E$ ), MNHNP 1974.813—4.  
 Annaba ( $36^{\circ}54'N$ ,  $7^{\circ}46'E$ ), USNM 58168.  
 Lambessa, Batna, ZFMK 22724.  
 Ausis, Batna, ZFMK 22725.

### ***Acanthodactylus savignyi* (Audouin)**

*Lacerta savignyi* Audouin, 1809: 172, pl. i, fig. 8. Type locality: "Egypte". Holotype, not located.

*Acanthodactylus vaillanti* Lataste, 1885: 509. Type locality: "Pays des Comalis". Holotype, MHNHP 6484.

*Acanthodactylus savignyi* var. *oranensis* Doumergue, 1901: 175, pl. xii, figs. 1–3. Type locality: "Oran, sur les sables de la Batterie espagnole". Syntypes, BM 1946.9.3.58–70. MHNHP 8956.

#### **Diagnosis**

Small species. Head more slender and pointed than in *A. erythrurus*. Frontonasal concavity is more accentuated than in *A. blinci* or *A. erythrurus*. Divided frontonasal. Two scales between the prefrontals. Supraocular region with extensive granular area. Two rows of granules between the supraoculars and the superciliaries.

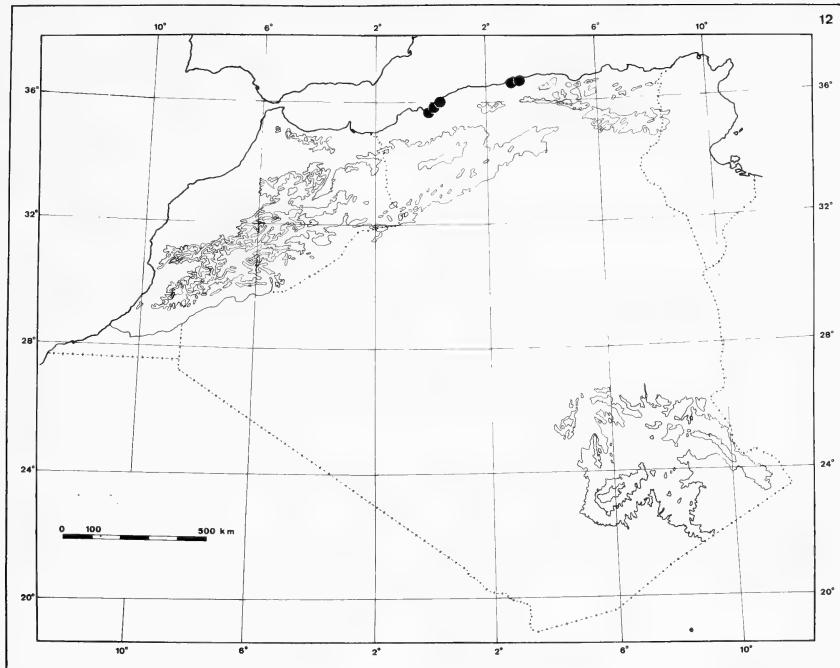
Scarce auricular denticulation. Distinguishable gular fold. Fourth toe more pectinate than in *erythrurus* or *blinci*. Sharply keeled dorsal scales. Color pattern consisting of dark narrow bands on each side of the back. Lightly pectinate eyelids. Three rows of scales on the fingers.

#### **Distribution**

Doumergue (1901) reported this species to commonly occur in Oran and along the coast between Camerata and Mostaganem. He also found it inland at Daya and in the area between Ain-Tedales and Sidi-Douma. All the material which I have examined comes from coastal Algeria. According to present evidence, it seems that *A. savignyi* is only a coastal species being substituted toward the interior plateaux by *A. erythrurus*.

#### **Discussion**

The story of *A. savignyi* has been plagued by errors and problems, the first being in the original description of the species where Audouin incorrectly described it as proper to Egypt. Another problem arises from the fact that the type specimen has been lost, thus making the identification of the species even more difficult. Anderson (1898) discovered that *savignyi* did not pertain to the Egyptian fauna and, therefore, rejected Audouin's claim. Lataste (1885) described what he thought was a new species, *A. vaillanti*, from Somalia. Several years later, however, it was discovered that the collections used by him were really nothing than *savignyi*, the confusion having stemmed from an error in the origin of the collections. Doumergue (1901) extensively studied the herpetofauna of Oran finding that Audouin's description agreed with the *Acanthodactylus* of the Oran coastal area. He listed them as the variety *oranensis*. This variety, however, has turned out to be invalid and so we have here included it in the synonymy of *savignyi*.



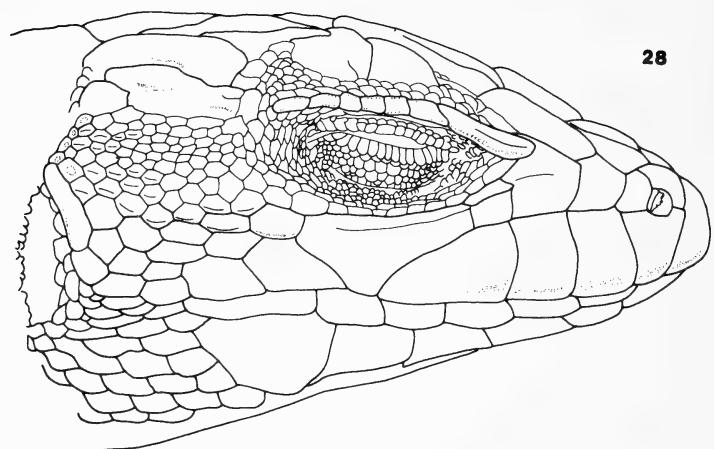
Map 12. Distribution of *A. savignyi*.

### Description

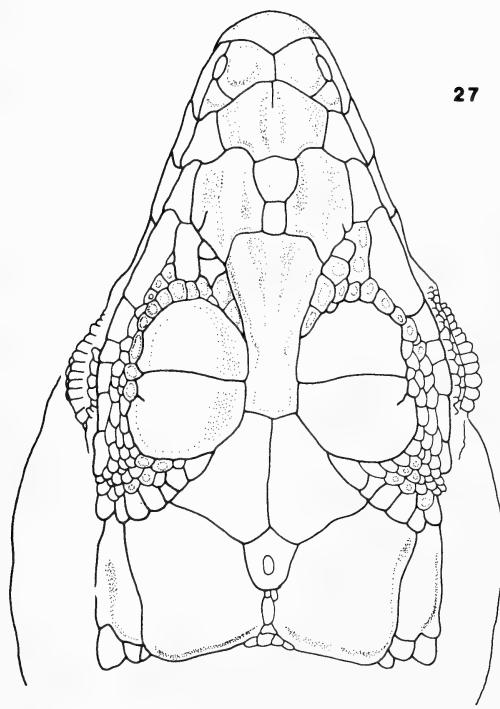
*A. savignyi* is characterized by a small body which is more slender than either *erythrurus* or *blanci*. In addition, its snout is more sharply pointed than in these other two species. The lanceolate concavity extending from the frontonasal to the posterior part of the frontal is very well defined. The nasal region protrudes only slightly. The presence of two scales separating the prefrontals is characteristic of *savignyi*.

The one next to the frontal is smaller and rectangular while the other one is larger and trapezoidal. There are sometimes granules separating the parietals. There are two large supraoculars corresponding to the second and third while the first and fourth are divided into many pointed granules. There are usually two, but sometimes three or more rarely one, rows of granules between the supraoculars and the superciliaries.

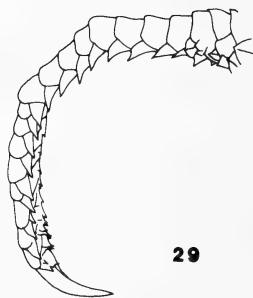
The superciliaries generally number six with the first one being the largest. Four supralabials lie anterior to the subocular, which in turn makes ample contact with the lip. There is only one very wide supratemporal followed posteriorly by one or two granules. The subocular displays a distinct keel bordering the orbit. The temporal scales are small and only weakly keeled.



28



27



29

Figs. 27—29. *A. savignyi*. Oran, Algeria. 27:BM 1946.9.3.59. 28: BM 1946.9.3.63. 29: BM 1946.9.3.67.

The outside edge of the eyelid is pectinate. The tympanic scale is medium-sized. Although auricular denticulation is scarce, it is still more noticeable than in *erythrurus*. The first three of the five pairs of submaxillaries make contact along the center. There are 23 to 31 gular scales lying in a straight line between the union of the submaxillaries and the central scale of the collar.

The imbrication of the gular scales is more pronounced than in *erythrurus*. A gular fold is distinguishable. The collar is angular and formed by 8 to 9 scales. The dorsals, arranged in 50 to 60 series across the middle of the body, are small, smooth and sharply keeled. The ventrals are arranged in both longitudinal and transversal straight rows with the longitudinal ones numbering ten. There are 19 to 26 femoral pores on each side lying in one continuous row across the body.

There are three rows of scales on the fingers. The toes are pectinate and more clearly denticulate than in *erythrurus*. On the underside of the fourth one, there are 19 to 22 unicarinate lamellae. The anterior upper surface of the tail is covered with large, sharply keeled scales.

Color pattern. Young specimens have four pale stripes along the back and two on each side, the upper one fragmented into ocelli. There is one dark band on each side of the back. They join together at the tail. The limbs are abundantly covered with white ocelli. The tail is blue. With age, the coloration becomes gray or brown and the dark bands become fragmented.

### **Specimens examined**

#### *Algeria*

2 mi. W of Ain el Turk, Oran, AMNH 67212(5).

Oran, MNHNP 8956 (syntype of *oranensis*), BM 1946.9.3.58—70 (syntypes of *oranensis*), BM 1913.7.3.8—9, FMNH 42830.

Batterie Espagnole, Oran, MCZ 27426—32.

Algiers, AMNH 1191.

Zeralda (36°43'N, 2°50'E), CAS 13840—2.

Zeralda beach, CAS 135931—2.

“Somalia”, MNHNP 6484 (holotype of *vaillanti*).

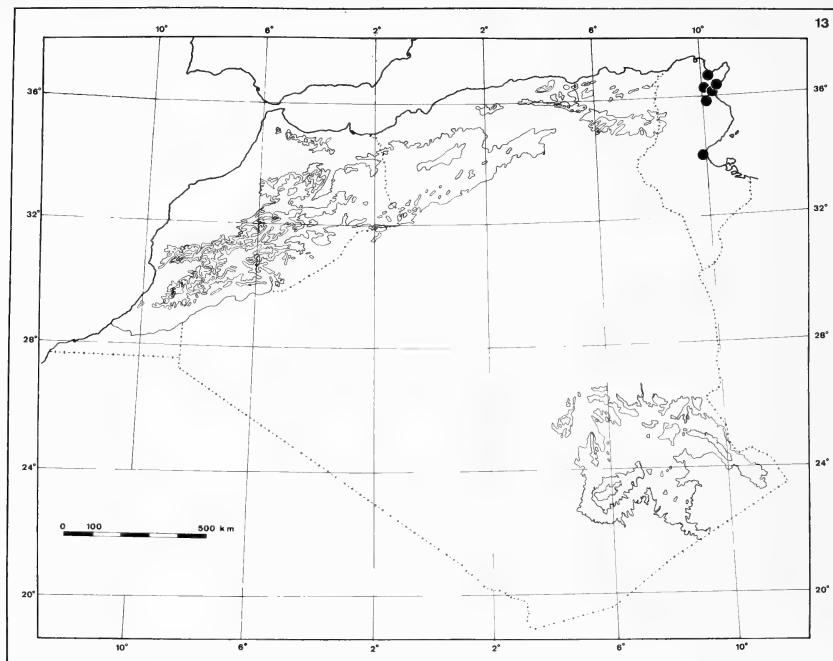
E of Arzew, BM 1971.727, 1971.1756—7.

### ***Acanthodactylus blinci* Doumergue**

*Acanthodactylus blinci* Doumergue, 1901: 184, pl. xiii, figs. 1—5. Type locality: “Hammam-El-Lif, près de Tunis”. Syntypes, BM 1946.9.3.3-5.

### **Diagnosis**

Large species, much larger than either *erythrurus* or *savignyi*. Head not as slender or pointed as in *savignyi* but neither as robust as in *erythrurus*. Smaller lanceolate concavity than in either of the other two species. Undivided



Map 13. Distribution of *A. blinci*.

frontonasal. Absence of scales between the prefrontals. Only one row of granules between the supraoculars and the superciliaries. No auricular denticulation. No distinguishable gular fold. Fourth toe as equally pectinate as in *erythrurus* but less so than in *savignyi*.

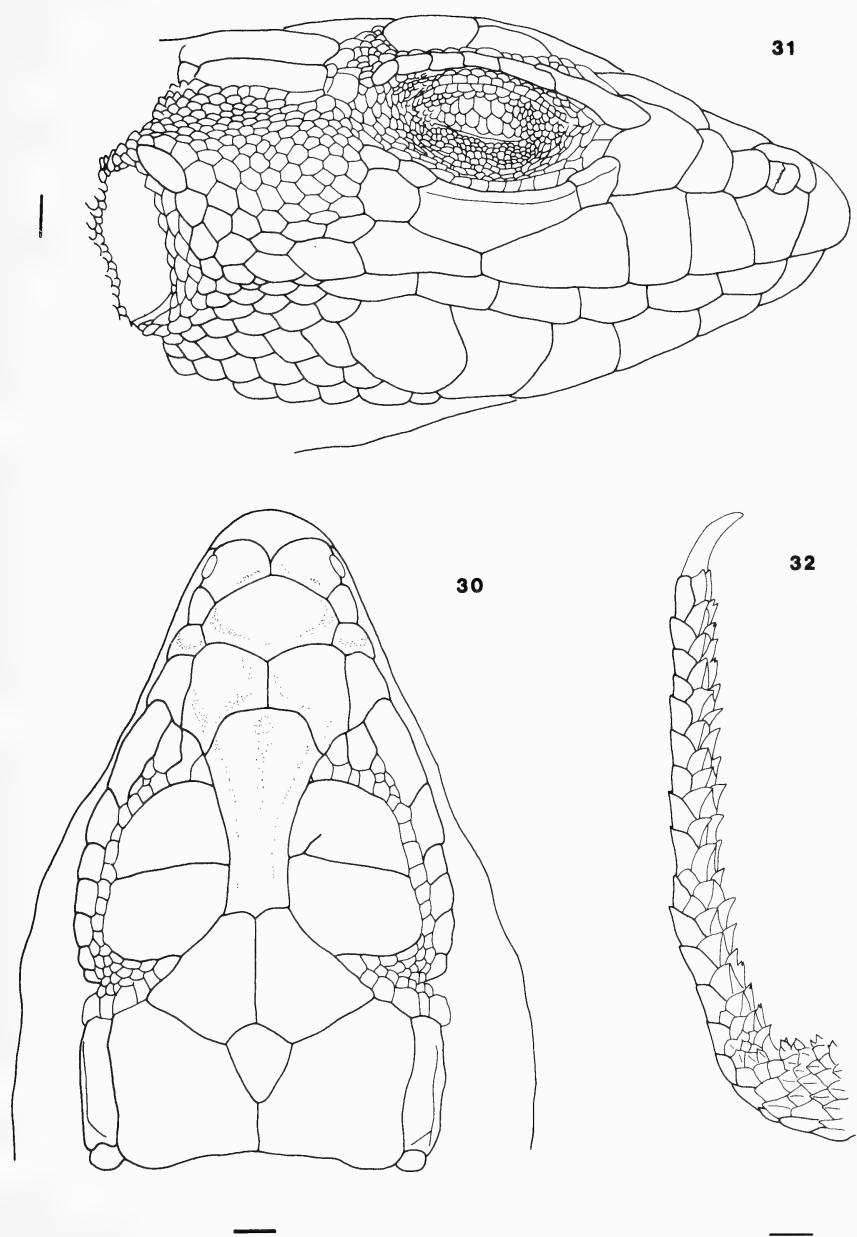
Sharply keeled dorsals. Blue tail in young as in *savignyi*. Eyelids without pectination. Three series of scales on fingers. Subocular not in contact with the upper lip.

### Distribution

Doumergue (1901) described this species in the outskirts of Tunis and reported that it was proper to the sandy coastal areas. The material I have examined for purposes of this study comes from the coastal areas of eastern and northern Tunisia. It should be interesting to find out if this species' distribution reaches the Algerian border.

### Discussion

Doumergue (1901) described *blinci* as a distinct species from *savignyi* and *erythrurus*. He bases this conclusion on the following combination of



Figs. 30—32. *A. blinci*. Tunis, Tunisia. BM 1946.9.3.3.

characters: blue tail, absence of interprefrontal scales, first and fourth supraocular greatly divided, subocular never in contact with the lip, 10 to 12 longitudinal rows of ventrals, and a blue-green coloration. Boulenger (1921) considered *blanci* to be only a variation of *erythrurus*, and later Mertens (1929) puts forth still another point of view by considering *blanci* to be a subspecies of *savignyi*. His assertion is based exclusively on the fact that in both *blanci* and *savignyi* the young have a blue tail, a character which is never found in populations of *erythrurus*.

This point of comparison, however, is insufficient as *blanci* has many more characters in common with *erythrurus* than with *savignyi*. One might even think for a moment that we are dealing with a subspecies of *erythrurus* but the present available evidence would soon contradict this hypothesis. First off, *blanci* seems to be restricted to sandy habitats along the coast of Tunisia as happens with *savignyi* in Oran. The *A. erythrurus belli* material examined did not reveal any intermediate specimens between the two. The Bone specimens from very near Tunisia are definitely typical *belli* with no approximation to *blanci* at all.

### Description

*A. blanci* is larger than either *savignyi* or *erythrurus*. The lanceolate concavity running from the frontonasal to the middle of the frontal is not very pronounced. The snout is slightly pointed, less so than in *savignyi* but more so than in *erythrurus*. The nasal region protrudes slightly. Looking from the side, the rostral amply extends out over the lower mandible. The suture between the nasals is minimal and only present posteriorly. The second and third supraoculars are large while the first and fourth are divided into granules. There is one row of granules between the supraoculars and the superciliaries.

Four supralabials lie anterior to the subocular. The subocular presenting a very prominent keel bordering the orbit is not in contact with the upper lip. There is one large supratemporal scale followed, at times, by a very small one. The temporal scales are granular and moderately keeled. A small tympanic shield is present. There is no auricular denticulation.

The first three of the five pairs of submaxillaries make contact along the center. The gular scales are granular in the anterior and central portion of the gular region while they are imbricate towards the collar. There is a distinguishable gular fold. The collar is rounded and made up of 10 scales. There are rounded granular scales covering the neck. These become slightly larger and flatter towards the back. The dorsals numbering 57 at midbody are sharply keeled.

The ventrals are arranged in straight longitudinal and transverse rows, with the longitudinal ones usually numbering 12. There are 21 to 23 femoral pores

on each side of the body running in one continuous row across the body. There are three series of scales on the fingers. The fourth toe with only scant lateral pectination has 20 subdigital tricarinate lamellae.

Color pattern. Young specimens have four white stripes along the back and two on each side. In addition, there are two dark bands on the back, each with a line of white dots running down them, and two dark bands on the sides, the upper one ocellated. The limbs are abundantly covered with white ocelli. The two dark dorsal bands join together on the upperside of the tail, which is blue (BM 1946.9.3.5). In another young specimen, but larger in size, the coloration is similar except for an increase in the size of the spots. In adults, the overall color is a blue-gray while the bands have become exceedingly reticulate. Several individuals examined in the Paris Museum (MNHN 1906.134—6) are very large, ranging in snout—vent length from 90 to 95 mm.

### Specimens examined

#### Tunisia

Hammam-El-Lif, Tunis, BM 1946.9.3.3—5 (syntypes of *blanci*), ZFMK 22723.

Nabeul (36°27'N, 10°44'E), near Cape Bon, BM 1902.7.14.1—4.

Gamarth (36°54'N, 10°19'E), BM 1966.426, 1965.496—7, FMNH 67008—9, 67011—14.

Outskirts of Tunis, MNHN 1906.134—6.

Tunis, ZFMK 22721—2.

Hammamet (36°24'N, 10°37'E), FMNH 67006.

Km. 16 by road N of Gabes, CAS 132804.

Maktar (35°51'N, 9°12'E), CAS 132679—84.

Maktaris ruins, Maktar, CAS 138725.

Anina, Tunis, ZFMK 22719—20.

Rades, Tunis, ZFMK 22716—8.

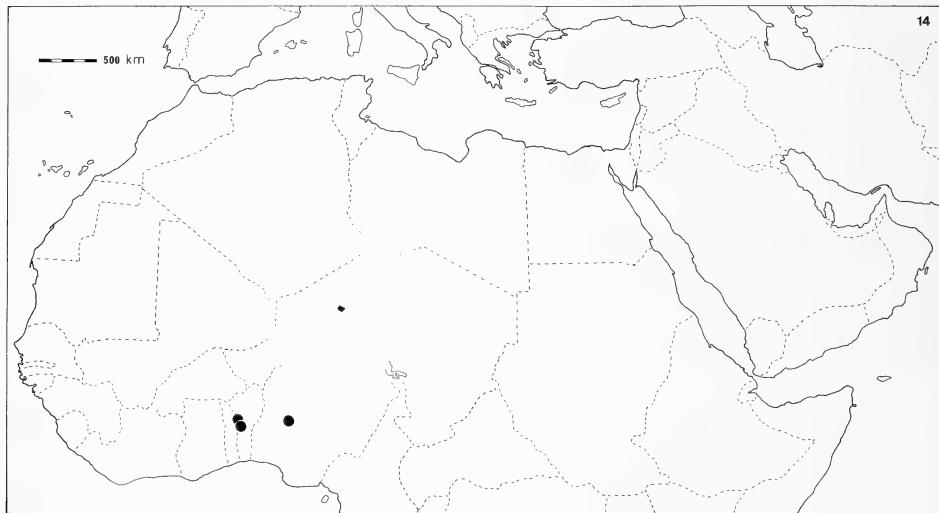
### *Acanthodactylus boueti* Chabanaud

*Acanthodactylus (Latastia) boueti* Chabanaud, 1917: 87, figs. 1—4. Type locality: "Agouagou, Dahomey". Syntypes, MNHN 1917.50—2, 1917.54—6, BM 1946.8.4.68.

### Diagnosis

Small species belonging to the *erythrurus* group. Three rows of scales on fingers. Only third supraocular preserved while other three reduced to mere granules. Small, keeled dorsal scales. Very fragmented parietals. Conspicuous lanceolate concavity. Two scales between prefrontals as in *savignyi*. Unpectinate eyelids. Ear opening lacking anterior denticulation.

The upper and lower lips come together evenly. Two rows of granules between the supraoculars and the superciliaries. Distinguishable gular fold. Ventrals arranged in straight longitudinal and transverse rows, the longitudinal ones numbering eight. Small and slightly keeled scales on the upper surface of



Map 14. Distribution of *A. boueti*.

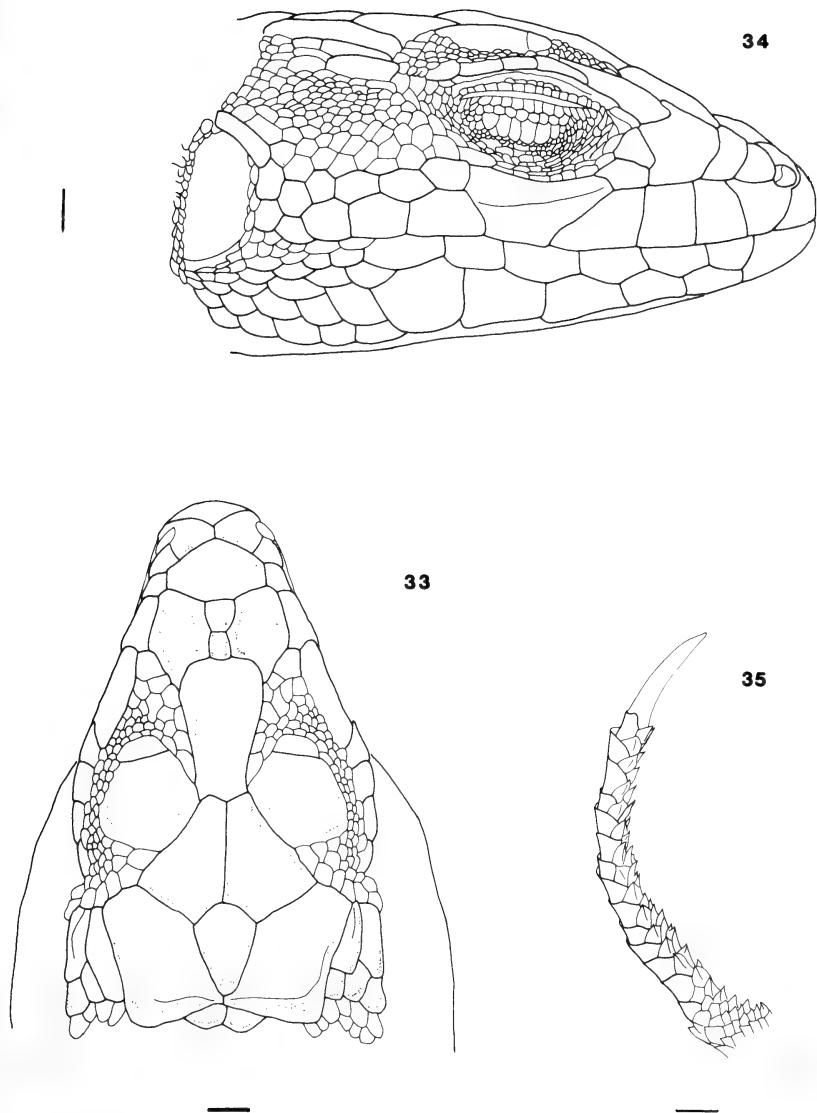
the tail. Low number of femoral pores. Almost nonexistent pectination of fourth toe. Nasal scale not denticulate. Short toes.

### Distribution

Once described from Agouagou, Dahomey in what is today Benin, *A. boueti* has not since been recorded. I was able to examine additional material from Bassila, Benin and from Lashambi, northwest of Wendri in Nigeria. These new data lead us to consider a wider distribution in arid zones south of the Sahara. The allopatric distribution of the species forming the *erythrurus* group on both sides of the Sahara is quite interesting from a zoogeographic standpoint. It suggests that in the past there must have been ancestral populations of this group uniformly distributed throughout northwest Africa.

### Discussion

When Chabanaud described *boueti* in 1917, he expressed doubts as to whether it belonged to the genus *Acanthodactylus* or *Latastia*. Four years later in his monograph, Boulenger included it under *Acanthodactylus*. In my opinion, *boueti* pertains to the *erythrurus* group. It constitutes a stock south of the Sahara separated by the desert from the other populations of the *erythrurus* group, which are now limited to the Iberian peninsula and Barbary. *A. boueti* is seemingly not related to *A. guineensis* whose differentiation from the *erythrurus* group must have taken place before the separation of *boueti* from the group.



Figs. 33—35. *A. boueti*. 33,34: Lashanti, Ghana, MCZ 49714. 35: Agouagou, Benin, BM 1946.8.4.68.

## Description

This species is characterized by a small robust body with a short blunt snout. There is a short posterior suture between the nasals (BM 1946.8.4.68 has an additional scale anteriorly). A deep lanceolate concavity runs between the intensely keeled prefrontals and the posterior portion of the frontal. As in *savignyi*, the prefrontals are separated by two scales, the anterior one being larger and shaped like a trapezoid while the posterior one is smaller and rectangular.

The parietals, which are small and fragmented on their outer edge, are arranged obliquely. A large interparietal is present. Only one large supraocular corresponding to the third is present. Lying along its anterior border are remains of the second while the other two are completely fragmented into numerous granules. There are two rows of scales separating the supraoculars from the five superciliaries. Four to five supralabials lie anterior to the subocular, which in turn makes ample contact with the upper lip. The temporals are very small and smooth.

The tympanic shield is small and there is no auricular denticulation. The collar is angular and formed by 6 large irregular scales. The first three of the five pairs of submaxillaries meet along the center. The gular scales, numbering from 19 to 26 in a straight line between the union of the submaxillaries and the central scale of the collar, are large, flat, and imbricate. The dorsals are very small and sharply keeled. The ventrals are arranged in straight longitudinal and transverse rows with the longitudinal ones numbering eight. The femoral pores, numbering from 14 to 18 on each side, run in one continuous row across the body.

The toes are short with 16 to 18 tricarinate lamellae on the underside on the fourth one, which displays practically no lateral pectination. The scales on the upperside of the tail are small and keeled.

**Color pattern.** Adult specimens have four off-white stripes along the back and one on each side of the body. In addition, there is a dark band on each side of the back and one on each side of the body. All of them are considerably fragmented. The limbs are diffusely reticulate. The uppersides are characterized by a gray-brown coloration. The young specimen also displays the six off-white stripes in addition to a red tail.

## Specimens examined

### Benin

Agouagou (7°59'N, 2°18'E), MNHN 1917.50—2, 1917.54—6 (syntypes of *boueti*), BM 1946.8.4.68 (syntype of *boueti*).

Bassila (9°01'N, 1°40'E), MCZ 51797.

### Nigeria

Lashambi (9°33'N, 6°15'E), near Banda Hills, NW of Wendri, MCZ 49714.

### ***Acanthodactylus guineensis* (Boulenger)**

*Eremias guineensis* Boulenger, 1887: 51. Type locality: "Brass, mouth of the Niger". Holotype, BM 1946.8.6.31.

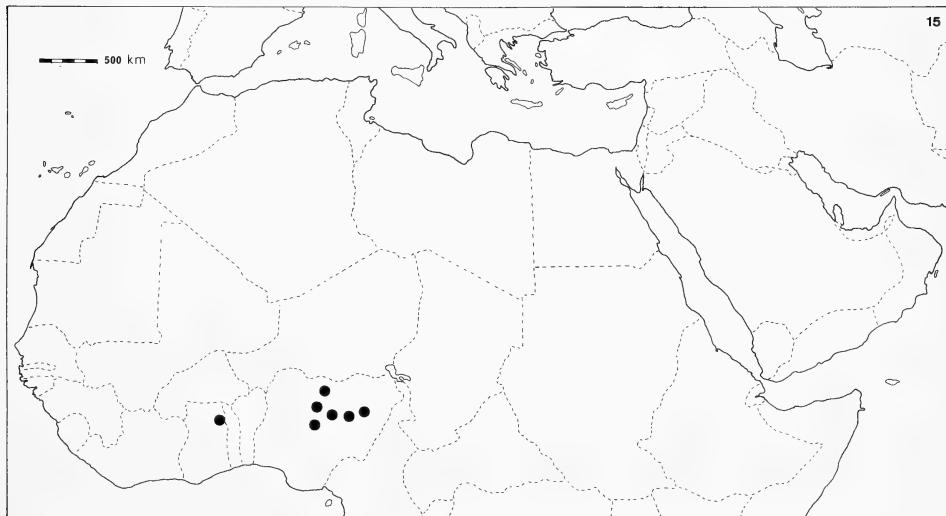
#### **Diagnosis**

Small species. Elongated depressed body. Very sharply pointed head. Relatively short hindlegs. Ill-defined lanceolate concavity. Prefrontals in contact. Two large supraoculars corresponding to the second and third with the fourth divided into two or three scales. Nostril situated among three scales. Two rows of granules between the supraoculars and the superciliaries. Four supralabials anterior to the subocular.

Subocular in contact with the upper lip. Small, weakly keeled dorsals. Ten straight transverse rows of ventrals. Toes tricarinate ventrally with scant lateral pectination.

#### **Distribution**

In 1887 Boulenger described *guineensis* using a young specimen which Hartert had collected from the mouth of the Niger river. There must have been an error, however, in the locality since all the material later collected comes from the arid zones of Nigeria and Ghana, this making more sense in the zoogeography of the genus *Acanthodactylus*.



Map 15. Distribution of *A. guineensis*.

## Discussion

In his description of *guineensis*, Boulenger classified it under the genus *Eremias*, but later in 1921 he created the subgenus *Taeneremias* basing this action on the unique position of *guineensis* within the genus. The diagnose he gave for this subgenus was as follows: "three nasals with both the lower and the posterior one in contact with the first supralabial, ventrals arranged in 10 straight longitudinal rows, occipital absent, and toes weakly compressed with tricarinate lamellae on the underside".

As this is precisely part of the diagnosis for *Acanthodactylus*, we include *Taeneremias* in its synonymy. The peculiar placement of the nostril and of the scales surrounding it, however, lead us to set *guineensis* apart within the *erythrurus* group.

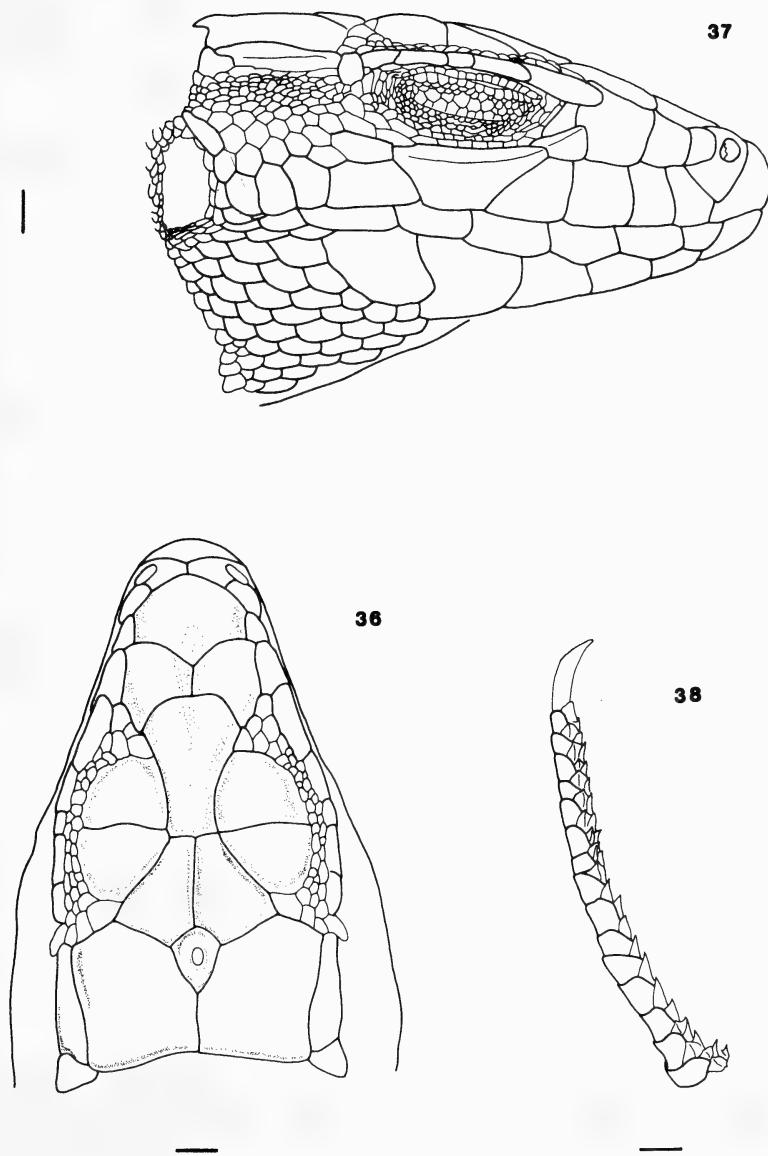
## Description

*A. guineensis* is characterized by a small, slender body and a relatively elongated head. There is a short posterior suture between the nasals. The lanceolate concavity extending between the prefrontals and the frontals is barely conspicuous. The prefrontals, slightly raised, are in contact, with no scale between them. The parietals are large and joined by a long suture. There is a large interparietal. The second and third supraoculars are large while the first is fragmented into granules and the fourth is divided into two or three scales.

The nostril is situated among three scales of which the lower one is lodged between the rostral and the first supraocular. Two rows of granules separate the supraoculars from the five superciliaries. There are four supralabials lying anterior to the subocular, which makes ample contact with the upper lip and displays a distinct keel bordering the orbit. The upper temporals are granular while the lower ones are large and smooth. A medium-sized tympanic scale is present.

There is only very scant denticulation on the anterior border of the ear opening. The eyelids are unpectinate. A nasal scale is present. The first three of the five pairs of submaxillaries make contact along the center. The gulars, numbering 21 between the union of the submaxillaries and the central scale of the collar, are large and keeled. The dorsal scales are small and only lightly keeled. The collar is rounded and made up of 10 large scales. The ventrals are arranged in 10 straight longitudinal rows with the transverse rows also straight. There are 18 femoral pores on each side running in one continuous row across the body. The toes present tricarinate lamellae and are only scarcely pectinate laterally. There are medium-sized, keeled scales on the upperside of the tail.

Color pattern. Adults specimens have four white stripes with tones of gray along the back and one on each side of the body. There is a dark gray band on each side of the back and a very fragmented one on each side of the body. The



Figs. 36—38. *A. guineensis*. Kigawa River, N Nigeria. BM 1930.10.6.9.

limbs present irregular gray reticulation. In young specimens, in addition to the bands mentioned above, which are even more conspicuous in the young, there are also some light and dark transverse bands of irregular pattern. These latter bands remind us of the genus *Latastia*.

### **Specimens examined**

“Brass, mouth of the Niger”, BM 1946.8.6.31 (holotype of *guineensis*).

#### **Nigeria**

Zonkwa ( $9^{\circ}47'N$ ,  $8^{\circ}17'E$ ), S of Zaria, BM 1961.1998—2000, 1962.575, 1961.952.

Kano ( $13^{\circ}02'N$ ,  $4^{\circ}24'E$ ), BM 1962.572.

10.5 mi. SW of Jos, Plateau prov., BM 1962.1661.

Vet. Unit, Zonkwa, Zaria prov., BM 1962.1662—4.

Maiduguri ( $10^{\circ}48'N$ ,  $11^{\circ}20'E$ ), Bornu prov., BM 1962.1665—9.

Kigawa river ( $10^{\circ}19'N$ ,  $10^{\circ}34'E$ ), N of Sherfuri, BM 1930.10.6.9.

Zaria ( $11^{\circ}04'N$ ,  $7^{\circ}42'E$ ), N.C.State, BM 1973.660.

#### **Ghana**

Nakpanduri ( $10^{\circ}38'N$ ,  $0^{\circ}11'W$ ), S of Bawku, BM 1966.286.

### ***Acanthodactylus pardalis* (Lichtenstein)**

*Lacerta pardalis* Lichtenstein, 1823: 99. Type locality: “Aegyptus”. Syntypes, Zoologisches Museum Berlin.

*Lacerta deserti* Milne-Edwards, 1829: 79, 86, pl. vi. fig. 8, pl. viii, fig. 6. Type locality: “Levant”. Syntypes, MNHNP 5322(2).

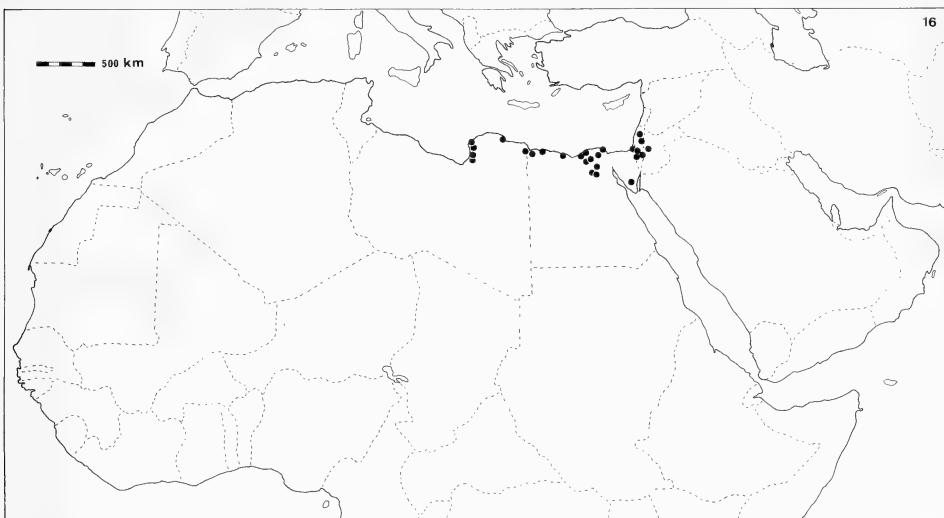
### **Diagnosis**

Medium or large robust body. Snout slightly pointed upwards. Three entire supraoculars and one, the fourth, divided into granules. One or two rows of granules between the supraoculars and the superciliaries. Three series of scales on fingers. Subocular not in contact with upper lip. Four supralabials anterior to the subocular. Unkeeled temporals. Anterior border of ear opening denticulate.

Tympanic scale small or totally absent. Flat medium-sized dorsals. Ventrals arranged in 12 straight longitudinal rows. Slightly pectinate fourth toe with uni or tricarinate subdigital lamellae. Scales on the upper surface of the tail either small or medium-sized and flat or lightly keeled. Males with 24 or 25 presacral vertebrae, females with 25. Males with irregular reticulate color pattern, females with two stair-shaped dorsal bands.

### **Distribution**

*A. pardalis* extends from Cyrenaica in eastern Libya across northern Egypt to southern Israel. Reports from Jordan and Syria are for the most part incorrect owing to confusions with other species. For example, Angel (1936) reported this



Map 16. Distribution of *A. pardalis*.

species' occurrence in Deir Ez Zor, Syria. But after my examination of this specimen, which is now in the Paris Museum (MNHN 1935.246), I have found it to actually be a young specimen of *A. grandis*.

The distribution of the species in Egypt has been extensively documented by Marx (1968). It's possible that some reports for the species in Jordan are valid as I have been able to confirm in my examination of the specimen LACM 74340 from Ara'ir, Jordan.

## Discussion

*A. pardalis* presents a greater variation in populations than the other species in the group. In 1921 in a discussion of the Palestine populations, Boulenger found the two most outstanding characters to be their larger size and stockier body when compared to the populations of Egypt. Nevertheless, other populations found on the extreme limits of the area of distribution, such as those of Cyrenaica, present a similar size and stockiness index as in the Palestine populations.

## Description

*A. pardalis* is characterized by a somewhat plump, medium-sized body. Its snout is slightly pointed upwards. There is a distinct lanceolate concavity extending from the frontonasal to the frontal. The nasal region is raised. There is a wide suture between the nasals. The tail is relatively short. The first three

supraoculars are entire while the fourth one is broken up into granules. There are one or two rows of granules between the supraoculars and the superciliaries, which in turn number from 6 to 8.

The nasal scale is denticulate. Four supralabials lie anterior to the subocular. The subocular, not in contact with the upper lip, has a distinct keel bordering the orbit. There is one large supratemporal scale followed by a smaller one. The temporal scales are not keeled. The tympanic scale is either small or completely absent. The anterior border of the ear opening is denticulated by 4 or 5 scales.

The first three of the five pairs of submaxillaries meet in the center. The gular scales are medium-sized and clearly imbricate, numbering 25 to 32 down the middle of the neck. The gular fold is either barely distinguishable or completely absent. The collar is angular or rounded and formed by 10 to 13 scales. The neck region is covered with granular, pointed scales while at the middle of the back they become medium-sized and completely flat, ranging from 55 to 71.

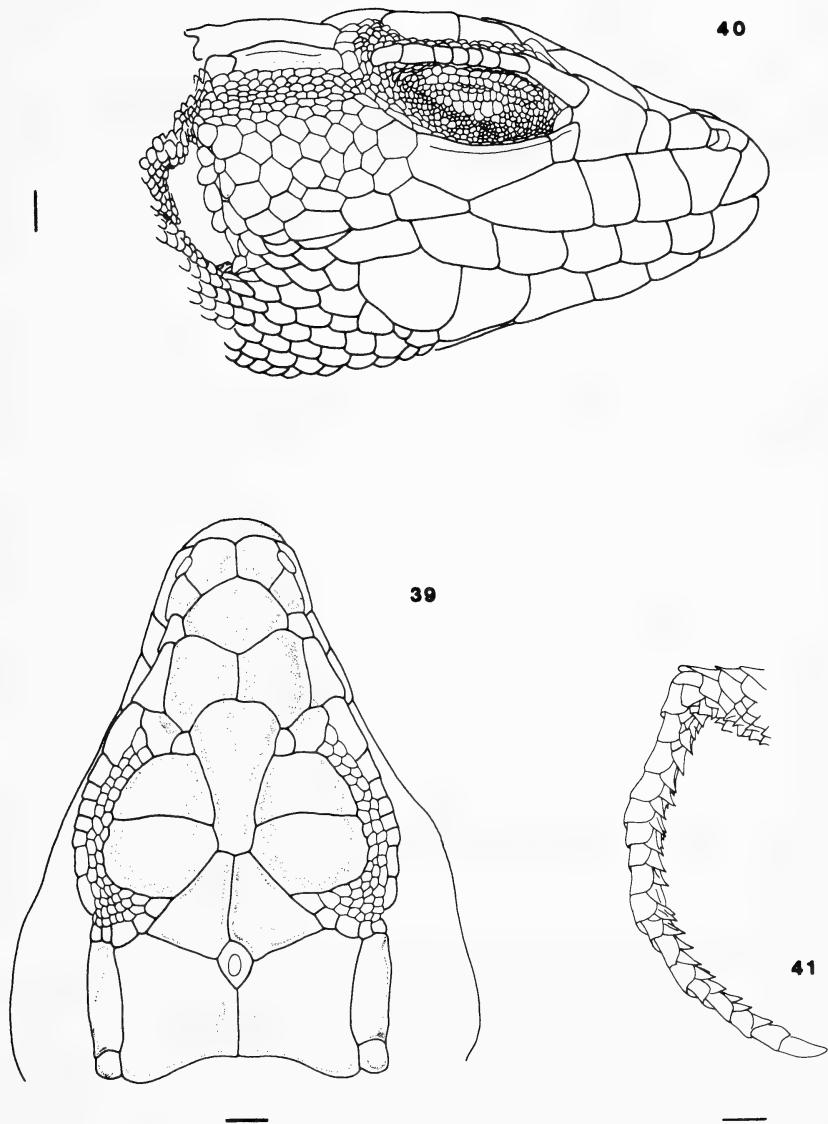
The ventrals are arranged in 12 straight longitudinal series with the transverse rows imbricate at the midline. The femoral pores, numbering 15 to 26 on each side lie in one row intersected at the center point by one or two scales. There are three series of scales on the fingers. The fourth toe is only barely pectinate with its subdigital lamellae having one or three carinae. The upper surface of the base of the tail presents small or medium-sized and flat or weakly keeled scales.

**Color pattern.** Adults have four rows of white or orange spots among which irregular remains of the dark color pattern can be seen. This is also apparent along the sides of the body. The limbs are reticulate and covered with indistinct pale ocelli.

### Specimens examined

#### Israel

- Tel Shoqet ( $31^{\circ}18'N$ ,  $34^{\circ}55'E$ ), TAU 10706.
- Dunes of Wadi Mishash ( $31^{\circ}08'N$ ,  $34^{\circ}46'E$ ), UF 14795.
- Hazerim ( $31^{\circ}14'N$ ,  $34^{\circ}43'E$ ), MVZ 84657.
- 13 km.,  $110^{\circ}E$  of Beer-Sheba, UF 14861(6).
- Nevatim ( $31^{\circ}13'N$ ,  $34^{\circ}54'E$ ), 9 km.,  $104^{\circ}E$  of Beer-Sheba, UF 13946.
- 2 km.,  $158^{\circ}E$  of Beer-Sheba, UF 14862(2).
- Road between Beer-Sheba and Asluj, MCZ 52271, BM 1959.1.1.61.
- Near Beer-Sheba, MVZ 97516, FMNH 34938.
- Beer-Sheba ( $31^{\circ}14'N$ ,  $34^{\circ}47'E$ ), TAU 7332, CAS 87430, BM 64.8.23.152—3, 1924.2.20.1—2.
- Be'er Mashash ( $32^{\circ}41'N$ ,  $35^{\circ}25'E$ ), CM 50966—8.
- Sde-Boker ( $30^{\circ}52'N$ ,  $34^{\circ}47'E$ ), FMNH 74458—9, MCZ 56439—40.
- Bir-Rekhme ( $30^{\circ}59'N$ ,  $34^{\circ}55'E$ ), FMNH 74457.
- Tel Arad ( $31^{\circ}17'N$ ,  $35^{\circ}08'E$ ), Hebron, BM 1924.2.20.3.
- Gaza, BM 1927.8.12.36—7.



Figs. 39—41. *A. pardalis*. Alexandria, Egypt. BM 97.10.28.326.

**Negev, BM 1952.1.4.77.**

Wadi El Milh (32°21'N, 35°33'E), Nabulus, AMNH 68169, FMNH 48490.

Tel Aviv, ZFMK 7103—4.

**Jordan**

Ara'ir (31°28'N, 35°49'E), LACM 74340.

**Egypt**

Gebel Uweinat, Wadi Prince (21°54'N, 24°58'E), FMNH 167872.

Kim Aushim (30°07'N, 31°08'E), FMNH 77981.

Kafr Mahfuz (29°27'N, 30°55'E), FMNH 77980.

179 km. W of Cairo, on the Alexandria highway, FMNH 78862—5.

El Hauwariya (30°58'N, 29°41'E), FMNH 78836—61.

Wadi El Natrun (30°25'N, 30°13'E), FMNH 77972—9.

El Bahariya Oasis (31°07'N, 30°28'E), FMNH 167863, 167866, 167869, 167878.

Outskirts of El Bahariya, FMNH 167883—4.

Matruh (31°21'N, 27°14'E), 5 km. W of Wadi Natrun, FMNH 164617.

Ikingi Mariut (31°00'N, 29°45'E), USNM 195477(9).

Bahig (30°55'N, 29°36'E), Matruh, FMNH 152612—5, 152617—8, 152621—2, 152625—6.

20 mi. W of SW Salum, FMNH 152616.

Matruh, Mersa Matruh, USNM 130333—7, 130343—50, 133203—4, FMNH 63042—4, 78822, USNM 130338—42.

El Daba (31°02'N, 28°26'E), near Mersa Matruh, USNM 131224—7.

Abu Matamir (30°43'N, 34°13'E), Mariut, FMNH 66113—5, 66117—9.

Burg El Arab (30°55'N, 29°33'E), USNM 133427—9, 134176—89, 135327, BM 1924.12.8.3—7.

Mariut, Burg El Arab (30°53'N, 29°45'E), FMNH 67228, 68858, 78823, 78825—8, 78833—5, UMMZ 113488(9), FMNH 78824, BM 97.10.28.323, FMNH 608.

Sidi Barrani (31°36'N, 25°55'E), FMNH 78830—1.

12 mi. S of Sidi Barrani, FMNH 78832.

Al Ammariyah (26°02'N, 32°45'E), USNM 136413—4.

Imbaba, Abu Rawash (30°04'N, 31°13'E), FMNH 82874.

Abu Rawash, USNM 133329.

Giza Pyramids (29°59'N, 31°08'E), FMNH 78829.

Wadi Nasim, USNM 134985.

Alexandria (31°12'N, 29°54'E), BM 1920.1.20.387 A.

Sellum (31°34'N, 25°09'E), BM 1924.12.8.8—9.

Bet-Al Asfar, near Kom-O-Skim, FMNH 58698—700.

**Libya**

7 km. E of Benghazi, BM 1954.1.6.5—7.

Solluch (31°39'N, 20°15'E), BM 1965.1259.

Capuzzo (31°35'N, 25°03'E), BM 1965.1260.

Near Tmimi (32°20'N, 23°04'E), BM 1965.1261.

Agedabia (30°46'N, 20°14'E), BM 1965.1262—5.

20 km. N of Agedabia, BM 1965.1266.

14 km. N of Agedabia, BM 1965.1267.

Txmimi, on the coast S of Bomba, MCZ 46799—800.

**Country unknown**

"Levant", MNHNP 5322(2) (syntypes of *deserti*).

### ***Acanthodactylus bedriagai* Lataste**

*Acanthodactylus bedriagai* Lataste, 1881: 357. Type locality: "Plateau de Sersou, Cyrenaque, Biskra, Hauts Plateaux, Tell (El Guerah, Setif, Constantine, Batna, Oued Sedeur, Oued Dermal), Sahara (Biskra, Bou Saada, Laghouat, Tilremt, Bou-Guelfaia, Le Mzab, Ouargla)". Restricted here to "El Guerah, Hauts Plateaux". Syntypes, BM 1946.9.4.21 (Sersou), BM 1946.9.3.50 (Batna), BM 1946.9.3.51, 1920.1.20.1324 (El Guerah).

#### **Diagnosis**

Large, robust body. Relatively short snout. One row of granules between the supraoculars and the superciliaries. Subocular separated from the lip by a small scale. Blunt temporals. Flat, unkeeled dorsals. Slight pectination of the fourth toe. Smooth, imbricate scales on the upperside of the tail. Small ventrals arranged in 14 longitudinal series. Three series of scales on fingers. Both male and female having 26 presacral vertebrae. Four lines of ocelli along the back with only slightly reticulate traces of pattern between them. Blue coloration.

#### **Distribution**

Populations fitting the above diagnosis are restricted to the eastern region of the Algerian Plateaux and to zones near Tunisia. In the remaining areas, that is, the western region of the Plateaux, south of them, and in Tunisia itself, this species is substituted by *A. maculatus*. Boulenger (1921) reported two specimens from Tamesmida in Tunisia to belong to this latter species, but after examining them myself (BM 1920.1.20.3018), I consider them to be *A. bedriagai* seeing that they have the same number of presacral vertebrae as in this species.

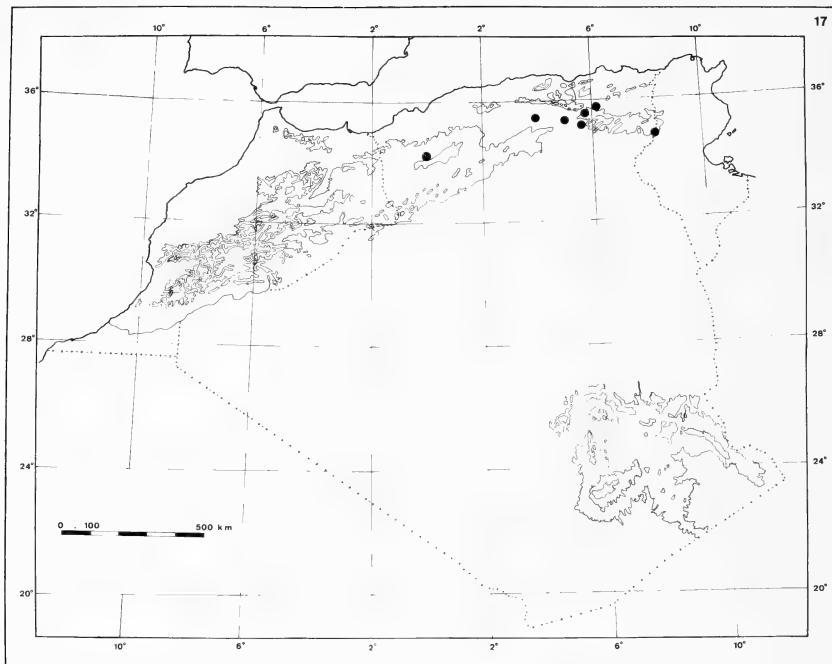
Another claim of *bedriagai* occurring in Tunisia was put forth by Boettger (1885), but since he mentions the number of longitudinal rows of ventrals to be ten, he must have been dealing with *maculatus* instead.

#### **Discussion**

As Lataste's (1881) long list of localities for *bedriagai* includes places which we are here considering as proper to *maculatus*, I have decided to restrict the type locality to El Guerah choosing the specimen BM 1920.1.20.1324.90 as the lectotype.

#### **Description**

*A. bedriagai* is characterized by a large, robust body with a snout slightly pointed upwards. The lanceolate concavity running from the frontonasal to the nasal is present, although inconspicuous. The nasal region is slightly raised. The first supraocular is entire while the fourth one is divided into granules. There is one row of granules between the supraoculars and the five to eight superciliaries.



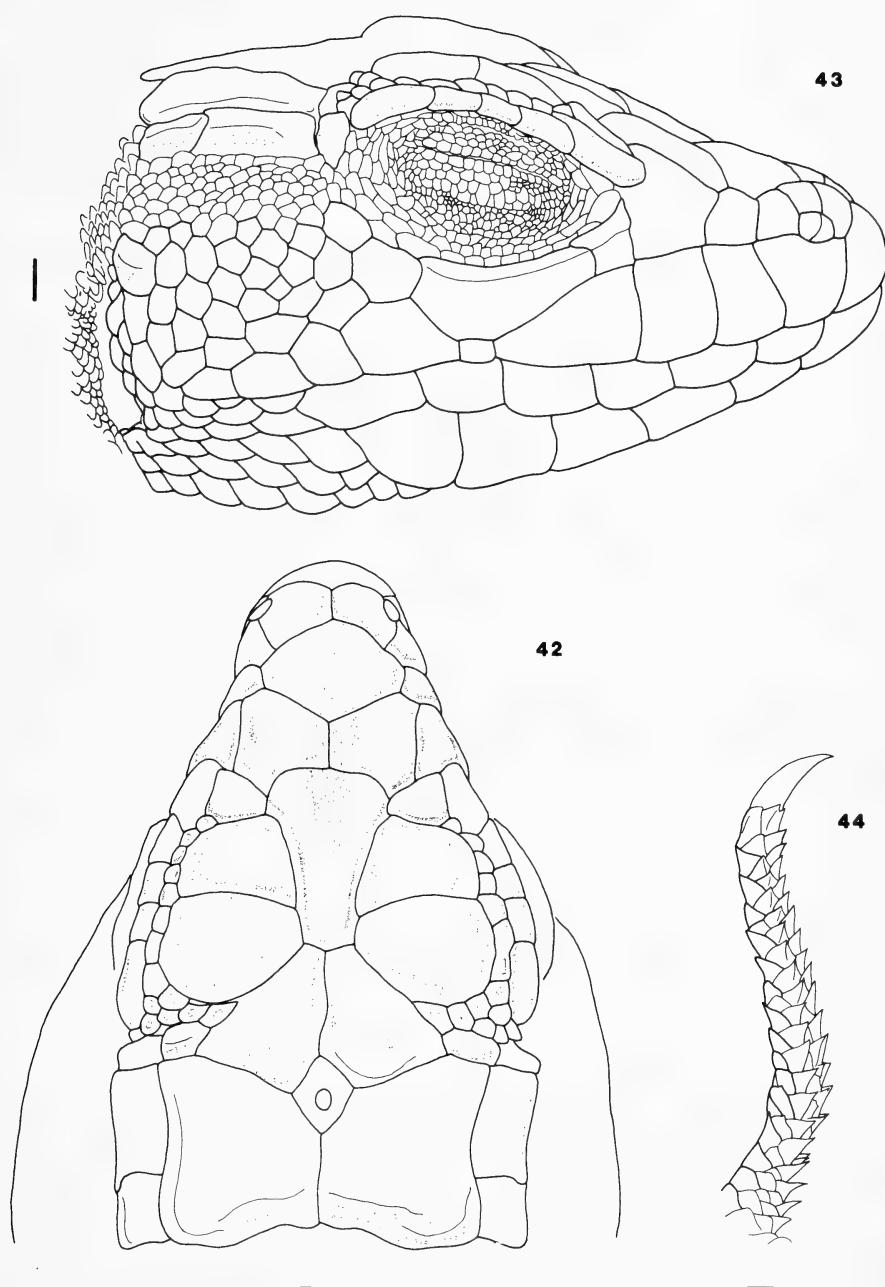
Map 17. Distribution of *A. bedriagai*.

Four supralabials lie anterior to the subocular. The subocular with its keel bordering the orbit is separated from the lip by a small scale. There are two supratemporals of which the anterior one is a little larger. The upper temporals are granular while the lower ones are larger, rounded and unkeeled. The anterior border of the ear opening is lightly denticulated by three or four scales. The first three of the five pairs of submaxillaries make contact at the center. The gulars, numbering from 26 to 31 down the center, are imbricate while the gular fold is indistinct.

The collar is rounded and formed by 9 to 14 scales. The scales covering the neck are granular and pointed. The dorsals, numbering 55 to 63 across the middle of the body, are flat, irregular, imbricate, and unkeeled. The ventrals are small and arranged in 14 longitudinal series. There are 15 to 21 femoral pores on each side running in one continuous row across the body. There are three rows of scales on the fingers.

The fourth toe with only light lateral pectination has 18 to 22 tricarinate lamellae. The scales on the upper surface of the tail are smooth and imbricate.

**Color pattern.** In adults the overall coloration is either brown or blue. In addition, there are four dorsal lines of white ocelli among which traces of black



Figs. 42—44. *A. bedriagai*. El Guerah, Algeria. BM 1920.1.20.1324(90).

bands can be seen. The sides of the body are somewhat reticulate in dark shades. The limbs are covered with some small light ocelli and barely visible reticulation.

### **Specimens examined**

#### **Algeria**

Sersou (35°23'N, 3°03'E), BM 1946.9.4.21 (syntype of *bedriaga*).  
 Batna (35°34'N, 6°11'E), BM 1946.9.3.50, 1920.1.20.1324 (syntypes of *bedriaga*), ZFMK 22755, BM 1920.1.20.1326 (skeleton).  
 El Guerah (28°11'N, 0°10'W), BM 1946.9.3.51, 1920.1.20.1324 (syntypes of *bedriaga*).  
 Aurès (35°14'N, 6°10'E), N of Biskra, BM 1891.5.4.70—2.  
 N'Gaous (35°33'N, 5°36'E), BM 1920.1.20.1484 (skeleton).  
 Oued Zouai, Les Lacs, 14 km. N of Ain Yagout, on Hy. N-3, CM 58430(6).

#### **Tunisia**

Tamesmida (35°05'N, 8°23'E), BM 1920.1.20.3018.

### ***Acanthodactylus busacki* n.sp.**

**Holotype**, BM 1970.250, 30 km. S of Goulimine, Morocco.

**Paratypes**, see specimens examined list.

### **Diagnosis**

Large, robust body. Short head with snout slightly pointed upwards. One row of granules between the supraoculars and the superciliaries. Four supralabials anterior to the subocular. Subocular not in contact with upper lip. Six superciliaries. Upper temporals granular and pointed while lower ones larger and unkeeled. Ear opening pectinated anteriorly by five scales.

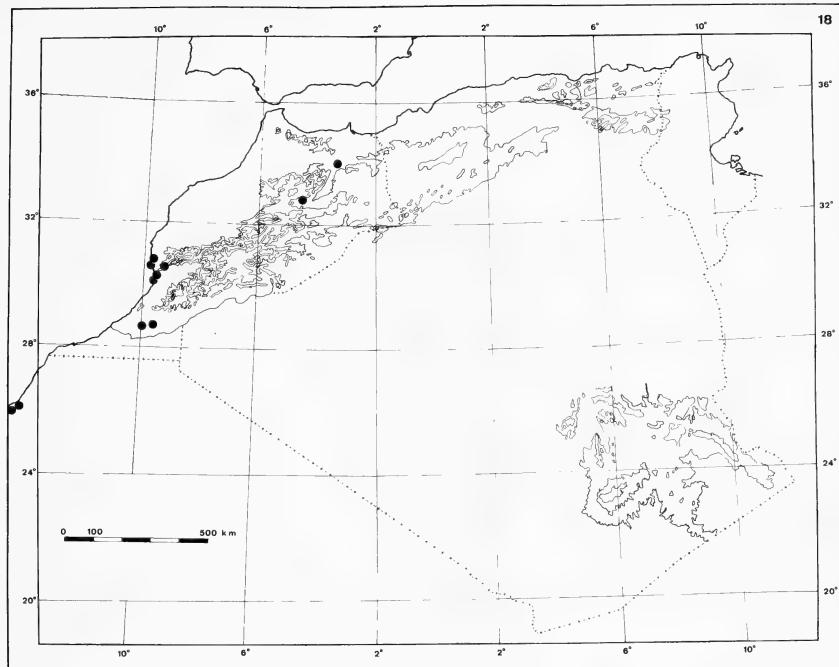
Smooth, weakly keeled dorsals. 12 straight longitudinal series of ventrals. Tricarinate lamellae on underside of fourth toe. Large keeled scales on the upperside of tail. Three rows of scales on the fingers. Both male and female with 26 presacral vertebrae. Color pattern consisting of four dorsal lines of white ocelli set in a very dense and conspicuous black reticulation.

### **Distribution**

In Morocco, there are populations both in the extreme southwest and in several localities in the east such as Mahiridja, Ain Guettara, and Itzer. I was also able to examine specimens from Asrifa and Cape Bojador in Rio de Oro.

### **Etymology**

This species is dedicated to my friend Stephen D. Busack.



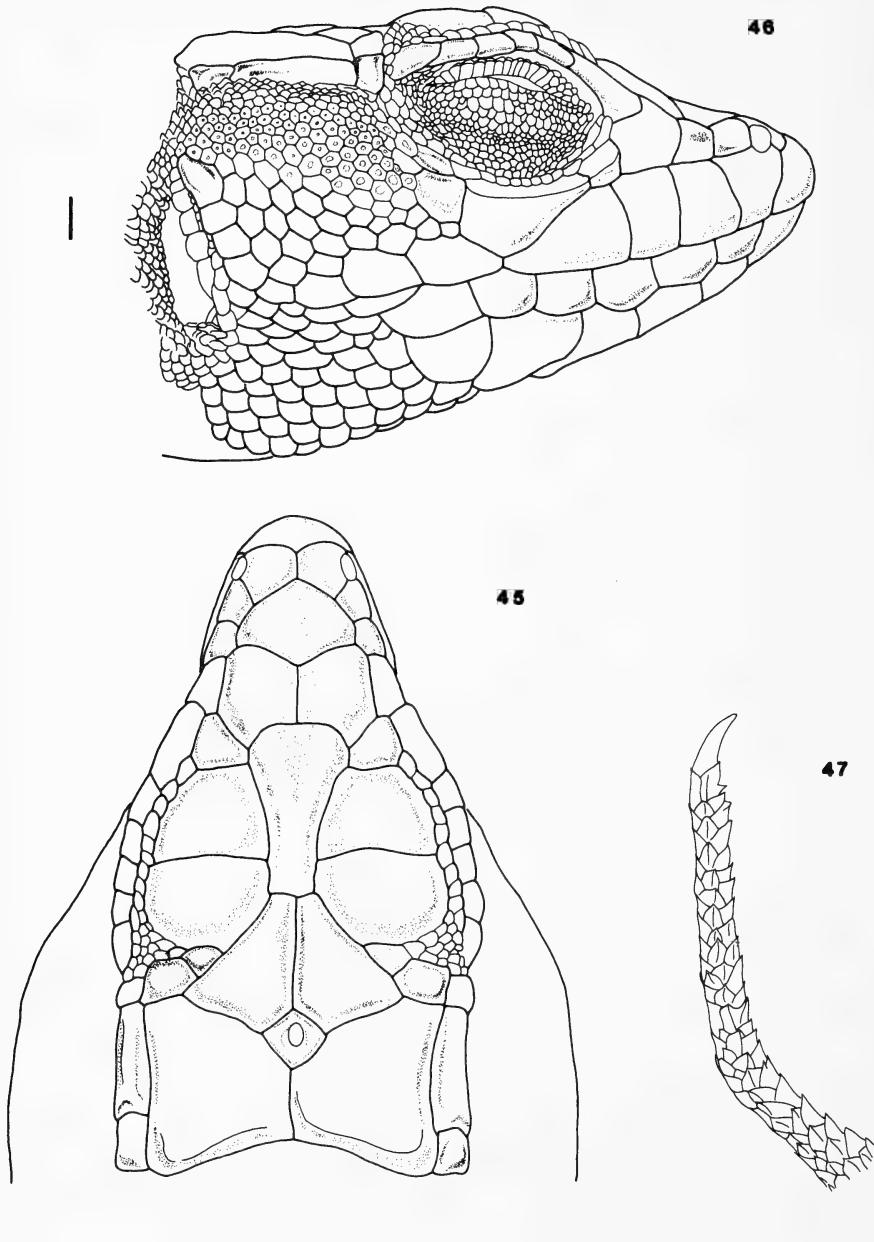
Map 18. Distribution of *A. busacki* n.sp.

### Description

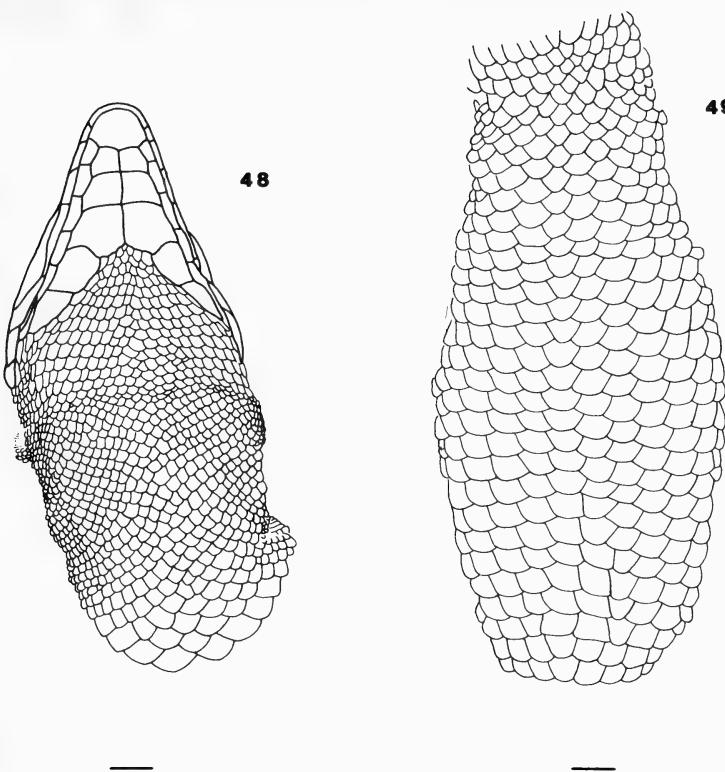
*A. busacki* is characterized by a large, robust body. The first supraocular is either entire or divided into two with some granules separating it from the second supraocular. There is one row of granules between the supraoculars and the superciliaries. The first of the six superciliaries is a little larger than the others. Four supralabials lie anterior to the subocular.

The subocular presenting a distinct keel does not make contact with the upper lip. The anterior supratemporal is larger than the posterior one. The lanceolate concavity is well-defined. The upper temporal scales are granular and pointed while the lower ones are larger and unkeeled. A small tympanic scale is present. Below it, there are two or three scales equal in size with the lowest one in contact with the supralabials.

The anterior border of the ear opening is pectinate with five scales. The collar is rounded and formed by 8 to 13 scales. The first three of the five pairs of submaxillaries make contact along the center. The gular scales, numbering from 24 to 35 in a straight line between the union of the third pair of submaxillaries and the central scale of the collar, are imbricate especially towards the collar. The gular fold is poorly defined. Granular pointed scales



Figs. 45—49. *A. busacki* n. sp. 45,46: 30 km. S of Goulimine, Morocco. BM 1970.250. 47,48: N of Agadir, Morocco. BM 1970.247. 49: 46 km. N of Agadir, Morocco. BM 1970.246.



cover the neck region. The dorsals, numbering from 55 to 68 across the middle of the body, are irregularly shaped, flat, imbricate and either smooth or weakly keeled.

The ventrals are arranged in 12 straight longitudinal rows. There are 17 to 23 femoral pores on each side running in one continuous row across the body. There are three rows of scales on the fingers. The toes have only scant lateral pectination and under the fourth one there are 18 to 25 tricarinate lamellae. The scales on the upperside of the tail are large and keeled.

**Color pattern.** The larger males display a heavy black reticulate pattern which is very irregular. The ocelli are lined up in four rows. The overall coloration is a gray-brown. The limbs present less obvious reticulation and a few light ocelli. The undersides are off-white.

### **Relationships**

*A. busacki* from southwestern Morocco is clearly related to *A. bedriagai* from the Hauts Plateaux of Algeria as well as to the *A. pardalis* populations of

Cyrenaica, Egypt and Israel. All of them have the same number of presacral vertebrae along with other skeletal characteristics in common. They are all large and robust, they all have flat or weakly keeled dorsal scales, and they are all similar in color pattern. One approach might be to suppose that they pertain to the same species but we would find that the differentiation and isolation between these three forms would make joining them difficult.

### **Specimens examined**

#### **Morocco**

- N of Agadir, BM 1970.246—7.
- Agadir, ZFMN 16076—7.
- Outskirts of Agadir, ZFMK 25826—41.
- 20 km. N of Tiznit, BM 1970.248.
- 30 km. SW of Goulimine, BM 1970.249—50.
- Agadir prov., FMNH 199916—21.
- 9 km. N of Tamri, FMNH 197897—8.
- 42.6 mi. N of Agadir, CM 55212—3.
- Shores of Oued Souss on Taroudant—Agadir road, CAS 92450—11.
- 10 km. S of Taroudant, ZFMK 16068—73.
- Taourirt (29°18'N, 9°21'W), MNHNP 1925.178—83.
- Mahiridja (33°59'N, 3°17'W), MNHNP 1925.175—6.
- Aoulouz, near Sous, ZFMK 16074—5.
- Ain Guettara (33°54'N, 3°24'W), MNHNP 1925.192—3, 1927.122(3).
- Inezgane, Agadir, ZFMK 18869.
- Itzer (32°53'N, 5°03'W), MNHNP 1925.184—90.

#### **Rio de Oro**

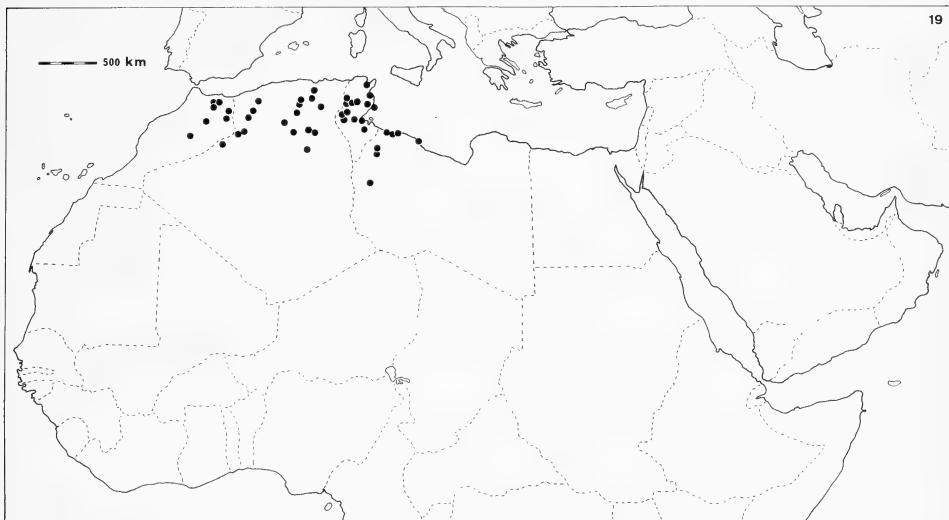
- Asrifa (26°19'N, 13°42'W), MNHNP 1938.189.
- Cape Bojador, EBD 2440.

### ***Acanthodactylus maculatus* (Gray)**

- Scapteira maculata* Gray, 1838: 281. Type locality: "Tripoli". Holotype, BM 1946.9.3.53.
- Zootoca deserti* Günther, 1859: 470. Type locality: "Ngoussa Oasis". Holotype, BM 1946.9.3.52.
- Acanthodactylus pardalis* var. *intermedius* Doumergue, 1901: 163, pl. x, fig. 1—5. Type locality: "Depuis la limite Nord des Haut-Plateaux jusque dans le Sahara". Holotype, not located.
- Acanthodactylus pardalis* var. *latastei* Boulenger, 1918 a: 153. Type locality: "Sud de la Tunisie, Algérie (Sahara et Hauts Plateaux)". Holotype, not located.

### **Diagnosis**

Small, slender body. Relatively long and pointed snout. One row of granules between the supraoculars and the superciliaries. Subocular not in contact with the lip. Three rows of scales on the fingers. Small granular temporal scales. Small tympanic scale present. Ear opening lightly pectinate anteriorly. Somewhat keeled dorsals.



Map 19. Distribution of *A. maculatus*.

Ventrals arranged in 12 straight longitudinal series. Fourth toe moderately pectinate. Medium-sized, keeled scales on the upper surface of the tail. Males with 24 presacral vertebrae, females with 25. Considerably diminished color pattern usually with traces of the two dark dorsal bands and the lines of ocelli.

### Distribution

*A. maculatus* is found in eastern Morocco and in the Haut Plateaux and Sahara desert region of Algeria. It is also found in Tunisia and in Tripolitania (Libya). Within these areas, the distribution of the species is primarily restricted to the oases found there.

### Discussion

*A. maculatus* consists of greatly varying populations which are more or less isolated in oases. A subspecies *latastei* from the Algerian Sahara has been described based on its longer snout, its lower number of dorsal scales, its more heavily pectinate toes, and its reduced color pattern. A comparison of the Moroccan, Algerian, Tunisian, and Tripolitanian populations reveals a notable variation among them but, nevertheless, as they all still match the diagnosis and description for *maculatus*, I include all of them in this form.

### Description

This species is characterized by a small body which along with *A. spinicauda* is more slender than any of the other species in the group. The snout, curving

slightly upwards, is relatively long and pointed. The nasals are raised. The lanceolate concavity extending between the frontonasal and the frontal is well developed. The first supraocular is either entire or divided into two. There is usually one row of granules between the supraoculars and the superciliaries, which number from 5 to 7.

There are four, or sometimes five, supralabials lying anterior to the subocular. The subocular with a keel bordering the orbit is never in contact with the lip. There is one large supratemporal followed by a smaller one. The temporals are granular and neither keeled nor pointed. A small tympanic shield is present. The anterior border of the ear opening is lightly denticulated by 4 or 5 scales.

The first three of the five pairs of submaxillaries make contact along the center. The gulars, numbering from 27 to 33, are imbricate while the gular fold is either ill-defined or totally absent. The collar is angular or rounded and formed by 9 to 14 scales. The dorsal scales, numbering from 50 to 63 across the middle of the body, are more or less keeled being more so towards the posterior portion of the back.

The ventrals are arranged in 12 straight longitudinal rows. There are 16 to 22 femoral pores on each side of the body running in one row intersected at the center point by one or two scales. There are three series of scales on the fingers. The fourth toe is scantily or moderately pectinate with 19 to 21 subdigital lamellae. The scales on the upperside of the tail are keeled and medium-sized.

Color pattern. The overall coloration is a pale gray completely lacking, or with only a few, white or orange spots. The pattern is greatly reduced with only indistinct lines of pale dots at times being present. Remains of the two dorsal bands can be seen. Along the sides, there are a few irregular black spots. The limbs are only lightly reticulate and covered with indistinct white ocelli.

### **Specimens examined**

#### **Algeria**

Wed Sedeur ( $34^{\circ}24'N$ ,  $3^{\circ}12'E$ ), BM 1920.1.20.1351 K.

Wed Dermal ( $32^{\circ}09'N$ ,  $0^{\circ}59'W$ ), BM 81.1.8.12—3, 1920.1.20.1351 F.

Mzab ( $32^{\circ}17'N$ ,  $5^{\circ}16'E$ ), BM 1920.1.20.1351 B.

Near Biskra, BM 1907.4.6.10—25, 1920.1.20.1351 i.

Between Biskra and Tuggurt, BM 1920.1.20.1351 a, 81.1.8.7, 1920.1.20.1351 h.

Ngoussa Oasis ( $32^{\circ}08'N$ ,  $5^{\circ}19'E$ ), BM 1946.9.3.52 (holotype of *Zootoca deserti*).

Bou Saada ( $35^{\circ}12'N$ ,  $4^{\circ}11'E$ ), BM 81.1.8.1—6, 1920.1.20.1351 g, ZFMK 18042—4, MCZ 28687, AMNH 1189—90, 1195, MNHNP 8537.

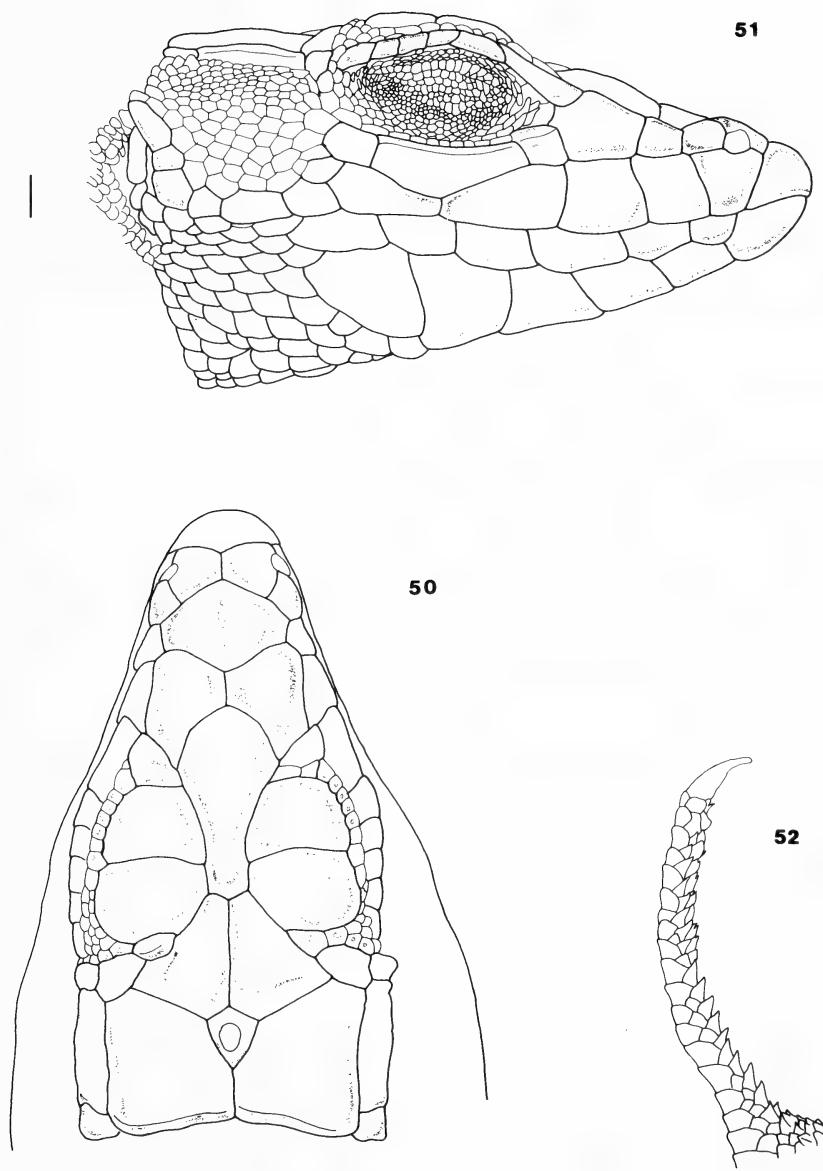
Bou Guelfaia, BM 1920.1.20.1351 c.

Between Tilremi and Laghouat, BM 1920.1.20.1351 d.

Laghouat ( $33^{\circ}48'N$ ,  $2^{\circ}53'E$ ), BM 81.1.8.10—1, 1920.1.20.1351 e, MNHNP 94.28.

Ghardaia ( $32^{\circ}29'N$ ,  $3^{\circ}40'E$ ), BM 1920.1.20.1351.

Between Wargla and El Golea, BM 1912.11.9.82—5.



Figs. 50—52. *A. maculatus*. Bou Saada, Algeria. BM 81.1.8.1—6(214).

Between Wed Nça and El Alia, BM 1912.11.9.86—8.

Biskra (34°51'N, 5°44'E), BM 1920.1.20.791, MNHNP 8536(6), ZFMK 22743—54, AMNH 17811—8, USNM 37273.

From Biskra to Tuggurt, BM 91.5.4.73—9.

S of Biskra, ZFMK 22726—42.

El Kreider (34°09'N, 0°04'E), BM 1920.1.20.3867, MCZ 27398—405.

Mecheria (33°33'N, 0°17'W), BM 96.4.22.10—2, MCZ 27396.

Kralfalla (34°33'N, 0°16'E), BM 97.10.4.10—1.

Figuig (35°37'N, 0°35'W), MNHNP 1919.97.

Ouargla (31°57'N, 5°20'E), MNHNP 90.180—2.

Between Ouargla, El Golea and Ghardaia, MNHNP 1922.232.

Baniou (35°25'N, 4°21'E), MNHNP 8535(2).

Hodna (35°35'N, 4°35'E), MNHNP 8539.

23 to 57 km. W of Ouargla, CAS 138582—3.

Colomb Bechar (31°37'N, 2°13'W), MCZ 27397.

Djelea (34°40'N, 3°15'E), FMNH 62141—6.

### **Libya**

Tripoli (32°54'N, 13°11'E), BM 1946.9.3.53 (holotype of *maculatus*).

Misurata (32°23'N, 15°06'E), BM 1913.12.30.11.

Sabratha (32°47'N, 12°29'E), BM 1965.1256.

Ain El Anma, BM 1965.1255.

Bir Allaq (31°05'N, 11°42'E), BM 1965.1257.

40 km. N of Bir Allaq, BM 1965.1258.

Maamura (32°43'N, 12°53'E), BM 1954.1.6.61.

200 km. SE of Derg, BM 1954.1.6.4.

### **Tunisia**

Duirat, BM 91.5.4.80—4.

Gabes (33°53'N, 10°07'E), BM 90.1.22.35—6, MNHNP 85.202, 85.199, ZFMK 22756—60.

Mettamer (33°22'N, 10°26'E), BM 1920.1.20.3018 d.

Bir El Ahmar (35°33'N, 10°39'E), BM 1920.1.20.3018 b.

S of Gafsa, BM 96.2.29.4.

Suqa (35°49'N, 10°38'E), BM 41.11.4.13.

Kerkennel (34°44'N, 11°14'E), BM 1964.1160—1.

El Hammam de Tozeur (34°29'N, 9°27'E), BM 1920.1.20.3018 c.

Feriana (34°57'N, 8°33'E), BM 1920.1.20.3018 e, MNHNP 85.200.

Tamesmida (35°05'N, 8°23'E), MNHNP 85.201.

Gafsa (34°25'N, 8°48'E), MNHNP 87.169.

Outskirts of Tunis, MNHNP 1906.138.

Haidra (35°34'N, 8°28'E), MNHNP 85.198.

Sbeitla (35°14'N, 9°08'E), FMNH 83710—2, 83714, ZFMK 20169—70.

40 km. N of Tozeur, FMNH 80004.

Soussa, FMNH 83750—4.

Tunis, UMMZ 67169, CAS 55169, ZFMK 22764—7.

40 km. W of Gabes on the road to Gafsa, CAS 138962.

Sfax, ZFMK 22761—3.

### **Morocco**

87 km. S of Berguent, Hamada, BM 1970.260—9.

Berguent (34°01'N, 2°01'W), MNHNP 1925.132.

Guercif (34°14'N, 3°22'W), MNHNP 1925.177.

Ksar Es Souk, ZFMK 7102.

Outat El Hadj (33°21'N, 3°42'W), MNHNP 1925.174.

Camp Berteaux (34°34'N, 3°01'W), MNHNP 1925, 196—7.

Oglat Cedra ( $33^{\circ}42'N$ ,  $2^{\circ}08'W$ ), MCZ 31438, 27395.  
 10 km. W of Ain Benimathar, ZFMK 26213.  
 20 to 40 km. N of Guercif, on the Saka road, CAS 92452—3.

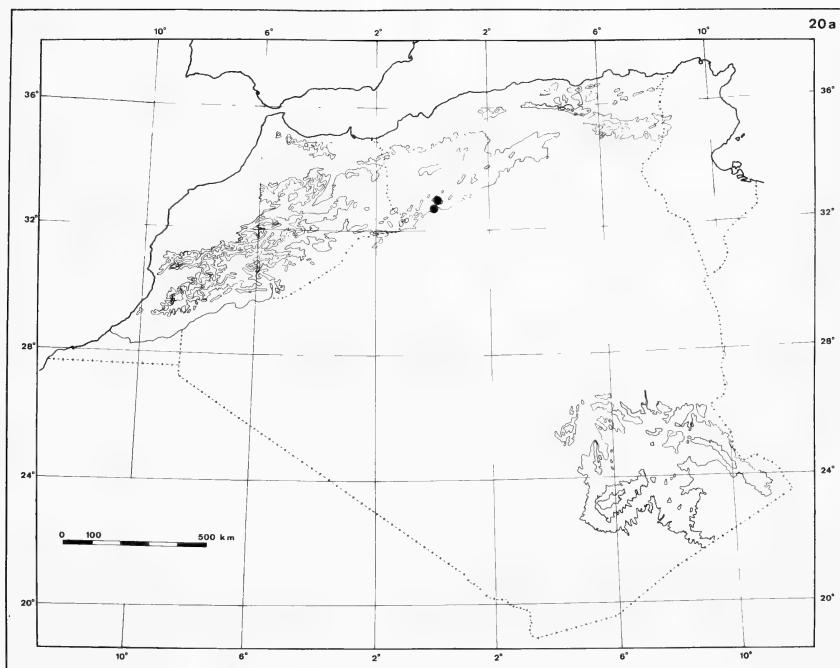
### *Acanthodactylus spinicauda* Doumergue

*Acanthodactylus pardalis* var. *spinicauda* Doumergue, 1901: 162, pl. xi, figs. 6—9. Type locality: “El Abiod-Sidi-Cheikh, Arba Tahtani”. Syntypes, BM 1946.8.5.34—43 (Arba Tahtani), MNHNP 8958 (El Abiod-Sidi-Cheikh).

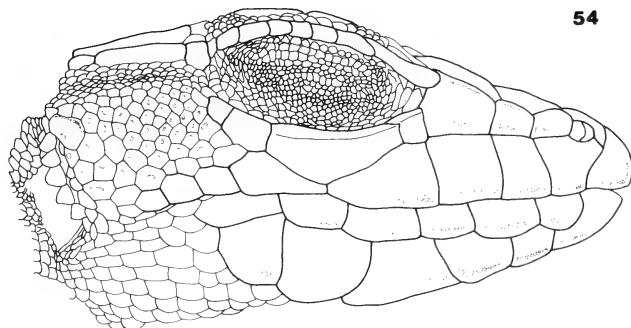
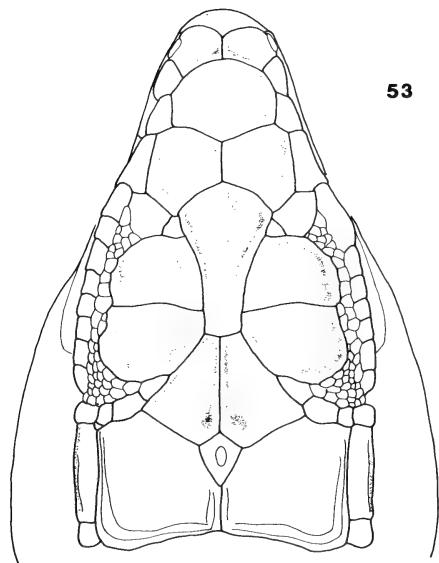
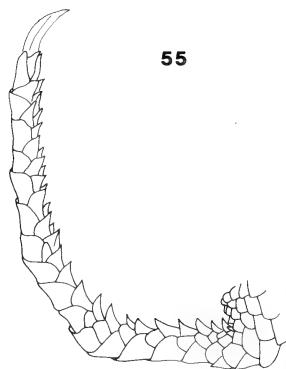
#### Diagnosis

Small species. Along with *maculatus*, body more slender than other species of *pardalis* group. Relatively long slender limbs with toes longer and more pectinate than in other species. Spiny sides of tail base. Pectinate eyelids. Distinct pectination of nasal scale. Anterior border of ear opening denticulate. Barely keeled, flat dorsals.

Subocular not in contact with upper lip. Three series of scales on the fingers. Males with 24 presacral vertebrae, females with 26. Color pattern greatly



Map 20a. Distribution of *A. spinicauda*.

**54****53****55**

Figs. 53—56. *A. spinicauda*. Arba Tahtani, Algeria. BM 1946.8.5.43.



56

diminished with near absence of dorsal stripes and bands. Conspicuous ocelli and reticulation on body sides.

### Distribution

In 1901, Domergue described this species from the oasis El Abiod-Sidi-Cheikh and the oasis Arba Tahtani. I have examined the type specimens from both of these localities. To my knowledge, no other samples of this species have been collected so, consequently, it is only known from a very limited area of the Saharan Atlas mountains in Algeria.

### Discussion

Doumergue (1901), followed by Boulenger (1921) described *spinicauda* as a variety of *A. pardalis*. In 1960, however, Pasteur & Bons raised it to the

specific status although they fail to specify their reasons for doing so. Of all the species of the *pardalis* group, *spinicauda* is most similar to *maculatus*. One could even think it's simply a subspecies of *maculatus* but let's take a look at why this is unlikely.

Appearing precisely in the *pardalis* group where the majority of its members have smooth scales covering the tail, the spiny character of *spinicauda*'s tail is unique for the genus *Acanthodactylus*. Other characters which support its being classified as a separate species are the length of its hindlegs and the shape of its head. It should be pointed out that although the only two localities where *spinicauda* has been found are included within the area of *maculatus*, these two species are not found in sympatry. We draw this conclusion from Doumercue's mention of only finding *A. scutellatus* next to *spinicauda* in these localities.

### Description

*A. spinicauda* is characterized by a small slender body and a pointed snout. The lanceolate concavity extending from the frontonasal to the frontal is visible but little developed. The nasals with a quite narrow suture between them are slightly raised. The first supraocular is entire while the fourth one is divided into granules of which the posterior one is the largest.

Four supralabials lie anterior to the subocular. The subocular presenting a prominent upper keel bordering the orbit is only found in contact with the upper lip in a few cases. The nasal scale is denticulated. The eyelids are lightly pectinate. The temporal scales are granular and unkeeled. There is one large supratemporal followed by a very small one. The anterior border of the ear opening is denticulated by 4 to 6 scales.

In front of the ear opening, there is a series of large scales extending from the upper lip. The first three of the five pairs of submaxillaries make contact along the center. The gulars, numbering from 26 to 31 in a straight line from the union of the submaxillaries to the central scale of the collar, are imbricate. There is no gular fold.

The dorsal scales, numbering from 44 to 56 across the middle of the body, are flat and lightly keeled. The ventrals are arranged in 12 straight longitudinal series. The transverse rows are imbricate at the midline. The collar is rounded and formed by 9 to 12 scales. There are 17 to 24 femoral pores on each side running in one continuous row across the body. The hindlegs are slender and elongated with relatively long toes. The fourth toe is only lightly pectinate and has 20 to 22 tricarinate lamellae on its underside. The scales covering the sides of the tail are sharply keeled and are larger than the dorsals, thus giving spiny appearance to the tail found nowhere else in the genus *Acanthodactylus*.

Color pattern. The general overall coloration is a pale greenish and bluish gray. There are two or three rows of orange ocelli set within a somewhat

dispersed reticulation. The color pattern on the sides of the body has practically disappeared with only a few dark spots remaining. The limbs present no ocelli and only traces of reticulation.

### **Specimens examined**

#### **Algeria**

Arba Tahtani ( $33^{\circ}05'N$ ,  $0^{\circ}35'E$ ), BM 1946.8.5.34—43 (syntypes of *spinicauda*).  
El Abiod-Sidi-Cheikh ( $32^{\circ}53'N$ ,  $0^{\circ}34'E$ ), MNHNP 8958 (syntype of *spinicauda*).

### ***Acanthodactylus tristrami* (Günther)**

#### **Diagnosis**

Large, robust body. Two supraoculars. One row of granules between supraoculars and superciliaries. Eyelids without pectination. Large ear opening without anterior pectination. Temporals granular and without keels. Subocular in contact with the upper lip. Four supralabials anterior to the subocular. Dorsals flat and without keels. 10 straight longitudinal rows of ventrals. Three rows of scales on fingers. Toes not pectinate. Scales on upperside of tail flat, medium-sized, unkeeled and subimbricate.

#### **Distribution**

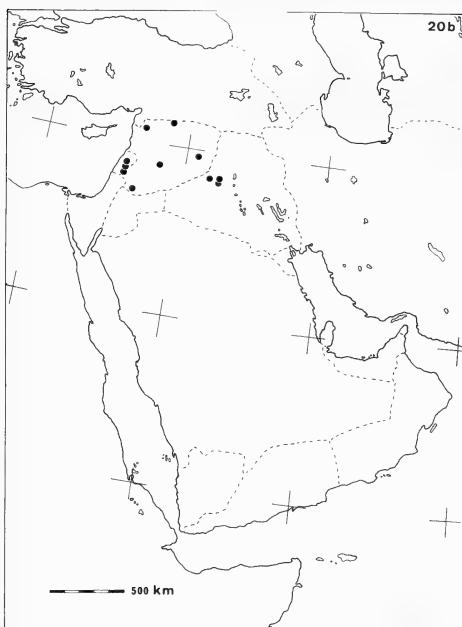
This species is found in Lebanon, Syria, Iraq, and Jordan.

#### **Discussion**

*A. tristrami* is directly related to *A. robustus* from the Syrian Desert. They are distinguished from each other by *robustus'* more robust body, its very short wide tail, and its flattened snout which slightly curls upwards. In *robustus* there may be either one or two rows of granules between the supraoculars and the superciliaries whereas in *tristrami* there is always only one.

In addition, the subocular in *robustus* is usually separated from the lip by a small scale whereas in *tristrami* it is always in contact. Another distinguishing character of *robustus* is the fold of skin partially covering the upper part of the ear opening. The number of longitudinal rows of ventrals is 12 in *robustus* while there are only 10 in *tristrami*. The color patterns are also different with the peculiar spotting of the tail in *robustus* especially standing out.

Apart from the notable individual variation and despite the limited amount of material available for *tristrami*, we can recognize a definite geographical variation among the populations of Lebanon, Syria, and Iraq. This has led to the description of various subspecies. Boulenger (1921), studying only material from the mountains of Lebanon, pointed out the large body size and the flat



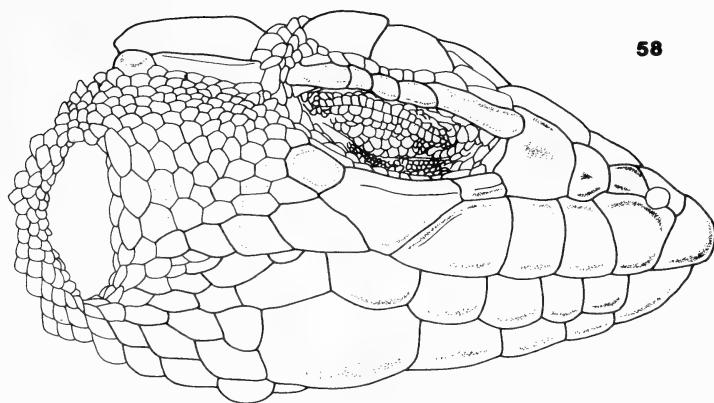
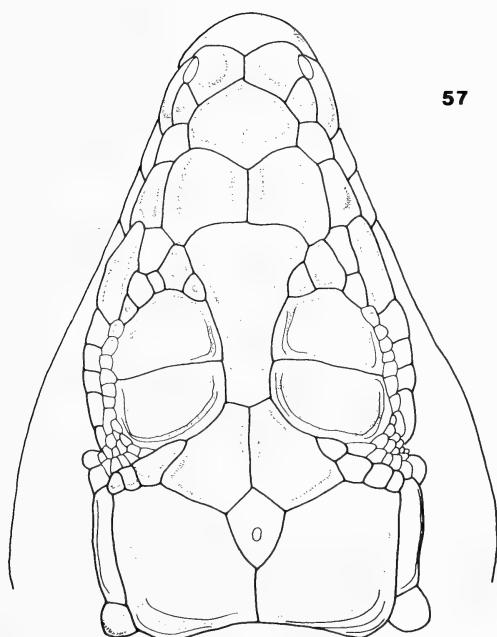
Map 20b. Distribution of *A. tristrami*.

scales on the upper surface of the tail. Angel (1936) described the subspecies *orientalis* from the Syrian desert basing the diagnosis on its smaller body size and lower number of dorsal scales.

Schmidt (1939) described the subspecies *iracensis* from Haditha, Iraq, setting it apart for its larger but fewer dorsals, its more pectinate toes, and its different color pattern. After examining the type specimens and other additional material, I have come to the conclusion that *orientalis* cannot be differentiated from *tristrami*, but rather, should only be considered a clinal variation of the latter. Even though only a few specimens have been studied, we can say that *iracensis*, on the other hand, does present significant differences from the Lebanon and Syrian populations.

### Description

This species is characterized by a medium-large, robust body with a normal shaped head. The nasals are not raised. The lanceolate concavity extending from the frontonasal to the middle of the frontal is moderately conspicuous. There are two supraoculars with one or two rows of granules between them and the superciliaries. The posterior supratemporal is much smaller than the anterior one; both have a barely distinguishable longitudinal keel.

**58****57****59**

Figs. 57—59. *A. tristrami tristrami*. Near Mt. Hermon, Lebanon. BM 1917.3.6.3.

Neither the eyelids nor the anterior border of the ear opening is pectinate. The temporals are small, granular, and unkeeled. The subocular with only a minimum keel is in contact with the upper lip. There are four supralabials lying anterior to it. The first three of the five pairs of submaxillaries make contact along the center. The gulars are large and only slightly imbricate, even less so near the collar. The tympanic scale is present. The collar is rounded and formed by 7 to 10 scales.

The dorsals, slightly larger than the laterals, are flat and smooth, numbering from 52 to 64 across the middle of the body. The ventrals are arranged in 10 straight longitudinal rows. There are 17 to 24 femoral pores on each side of the body running in one continuous row. There are three rows of scales on the fingers. The toes have no lateral pectination and on the underside of the fourth one there are 19 to 23 tricarinate lamellae. The scales on the upper surface of the tail are flat, medium-sized, unkeeled, and subimbricate.

**Color pattern.** There are one lateral and two dorsal rows of black spots with white ocelli. The limbs are gray with small white ocelli and no reticulation. The undersides are white with black flecks on the neck and chest. On each side of the head and the neck there are white spots.

### ***Acanthodactylus tristrami tristrami* (Günther)**

*Zootoca tristrami* Günther, 1864a: 491. Type locality: "Lebanon". Holotype, BM 1946.9.3.73.

*Acanthodactylus dorsalis* Peters, 1869: 62. Type locality: Unknown. Syntypes, Zoologisches Museum Berlin, No. 1056—8.

*Acanthodactylus tristrami orientalis* Angel, 1936: 109. Type locality: "Palmyre, Tell Abiad, Ain Zahra, Deir Ez Zor". Syntypes, MNHNP 1935.231—5 (Palmyre), 1935.236 (Tell Abiad), 1935.237 (Ain Zahra), 1935.238 (Deir Ez Zor).

### **Diagnosis**

Relatively large subspecies with snout—vent length ranging from 60 to 90mm. Wide head and short snout. Small dorsal scales numbering from 52 to 64 across the middle of the body. Toes unpectinate.

### **Distribution**

*A. t. tristrami*, typical subspecies, is found in Lebanon and Syria.

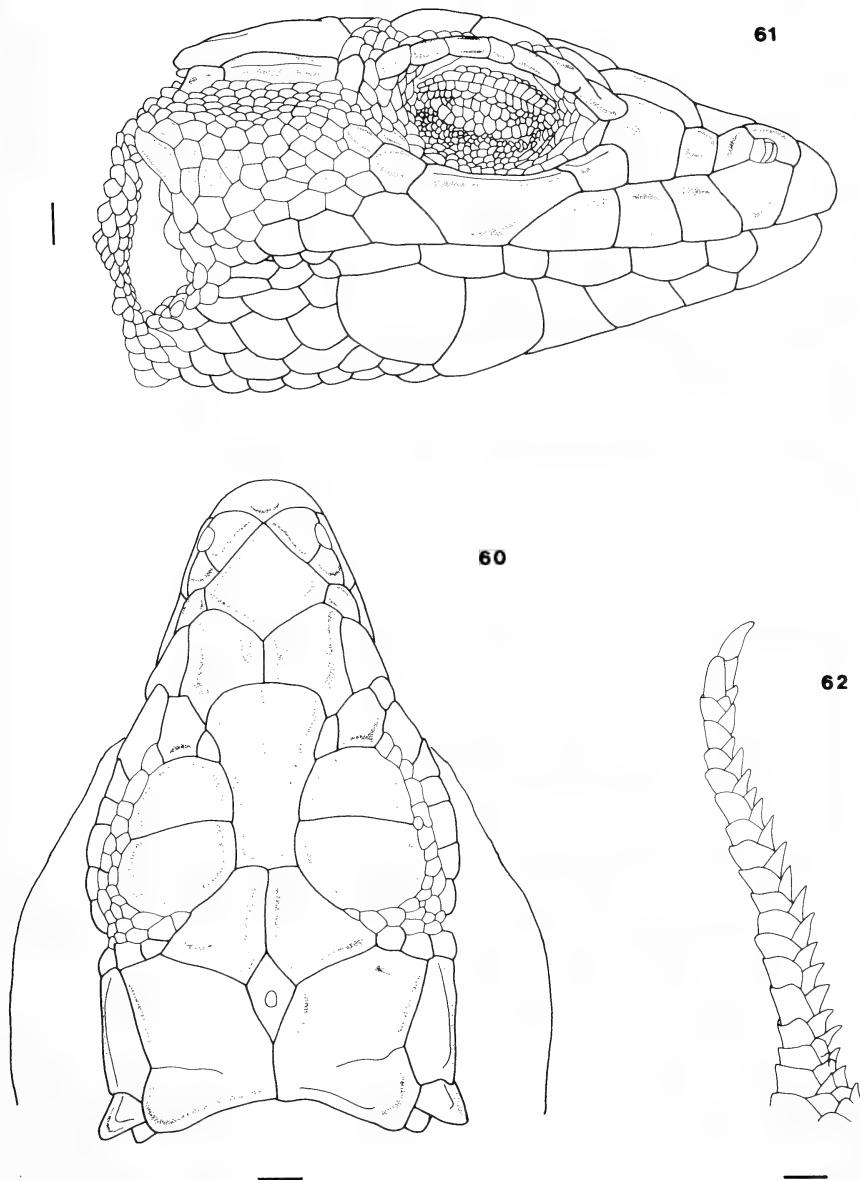
### **Specimens examined**

#### **Lebanon**

"Lebanon", BM 1946.9.3.73 (holotype).

Between Kefr Hawar and Artuz, BM 81.6.6.29.

Between Baalbek and Shtora, BM 81.6.6.27.



Figs. 60—62. *A. tristrami iracensis*. An Najaf, Iraq. BMI 333.

NE slope of Mt. Hermon, Anti-Lebanon, BM 81.6.6.26.

Near Mt. Hermon, BM 1917.3.6.1—3.

#### Syria

Palmyre (34°33'N, 38°17'E), MNHNP 1935.231—5 (syntypes of *orientalis*), MNHNP 1976.359.

Tell Abiad, MNHNP 1935.236 (syntype of *orientalis*).

Ain Zahra, MNHNP 1935.237 (syntype of *orientalis*).

Deir Ez Zor, MNHNP 1935.238 (syntype of *orientalis*).

Derea (32°37'N, 36°06'E), BM 1975.1088.

Jebel Mayar (36°23'N, 37°02'E), BM 1975.1089.

#### Jordan—Syria

Customs Shed, BM 1962.352.

### ***Acanthodactylus tristrami iracensis* Schmidt**

*Acanthodactylus tristrami iracensis* Schmidt, 1939: 60. Type locality: "Haditha, Iraq". Holotype, FMNH 21679.

#### Diagnosis

Small subspecies with snout—vent length ranging from 50 to 57 mm. Relatively large dorsals numbering 42 to 50 across the middle of the body. Pectination of the toes more developed than in *A. t. tristrami*.

Color pattern. There are white spots around the ear opening, on the cheeks, and under the eye. There is both a supraciliary and a subocular row of white spots circled in black which extend into the tail.

#### Distribution

This subspecies occurs in Iraq.

#### Specimens examined

##### Iraq

Haditha (34°07'N, 42°23'E), FMNH 21679 (holotype of *iracensis*), FMNH 21677, MCZ 45605, 53916 (paratypes of *iracensis*).

K-3 Station, Iraq Petr.Co.Pipeline, near Haditha, on the Euphrates, MCZ 56653—4, 56657—8.

10 mi. E of T-1, MCZ 56660—3.

An Najaf, Euphrates, BMI 333.

### ***Acanthodactylus robustus* Werner**

*Acanthodactylus robustus* Werner, 1929: 240, Fig. 2. Type locality: "Syrische Wüste bei Bir Molusi (Ka'ra)". Holotype, NMW 23362.

### Diagnosis

Very robust body. Short wide head. Relatively short limbs and tail. Two supraoculars corresponding to the second and third, first and fourth divided. One or two rows of granules between the supraoculars and the superciliaries. Unpectinate eyelids. Unpectinate ear opening with upper half covered by fold of skin.

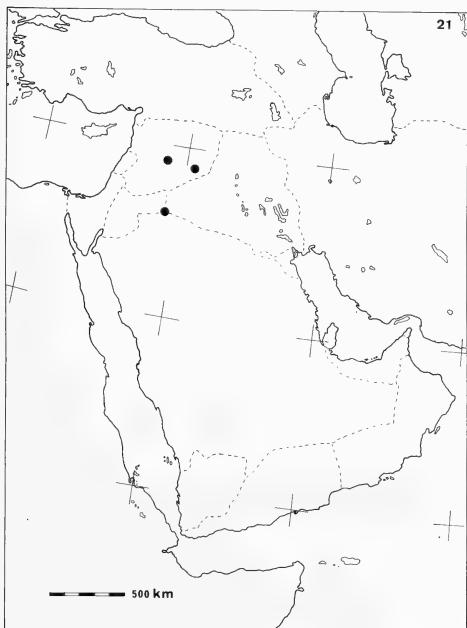
Granular temporals. Indistinct subocular keel. Subocular separated from upper lip by a small scale. Four supralabials anterior to subocular. Gulars large and imbricate. 12 straight longitudinal rows of ventrals. Dorsals smooth, flat, and slightly larger than laterals. Scales on upper surface of tail large, smooth, and imbricate. Three series of scales on fingers. Scant pectination of toes.

### Distribution

This species is known from the Syrian desert and Iraq.

### Discussion

See the discussion for *A. tristrami*. From the time of its discovery and first description, few other specimens of this rare species have been recorded. Schmidt (1930) studied a specimen from Jebel Enaze along the common border of Saudi Arabia, Jordan, and Iraq while Haas (1943) reported a specimen from



Map 21. Distribution of *A. robustus*.

Ma'an. In 1953, Riney commented on the ecology of what he thought to be *A. tristrami orientalis* from Palmyra, but as I have been able to verify after examining the specimens, they belong to *A. robustus*. Finally, in 1969 Haas & Werner reported this species 20 miles north of the station T-2 between the IPC Pipeline and Qariatein.

### Description

This species is characterized by a very robust body, a short wide tail, and relatively short legs. The nasals are raised and protrude out to the side. There are three supraoculars with the first one at times being divided. The anterior supratemporal is larger than the posterior one; both have a longitudinal keel. Both the supranasal and the supraocular regions are sharply raised. The lanceolate concavity is barely present.

There are one or two rows of scales between the supraoculars and the superciliaries, which in turn number from 6 to 8. The eyelids are not pectinate with medium-sized scales covering the lower lid. The ear opening has no anterior pectination but is characterized by a fold of skin partially covering the upper portion. The temporals are small and granular. The subocular with its indistinct keel is usually separated from the lip by a small scale, however, at times it is in contact with it.

There are four supralabials lying anterior to the subocular. The first three of the five pairs of submaxillaries meet along the center. The gulars are large and imbricate with no gular fold being present. They number from 23 to 32 down the center. The collar, formed by 7 to 9 scales, is rounded. The ventrals are arranged in 12 straight longitudinal rows. The dorsals, numbering from 51 to 60 across the middle of the body, are smooth, flat, unkeeled, and slightly larger than the laterals. The scales on the upperside of the tail are smooth, large, and imbricate. The fingers present three series of scales. The toes are only scantily pectinate with there being 19 to 26 tricarinate lamellae on the underside of the fourth one. There are 23 to 28 femoral pores on each side of the body.

Color pattern. The dorsal coloration is reticulate with three or four irregular rows of large pale spots. Each side of the tail presents alternating light and dark coloration.

### Specimens examined

#### Syria

20 mi. N of T-2, MCZ 56648—9.

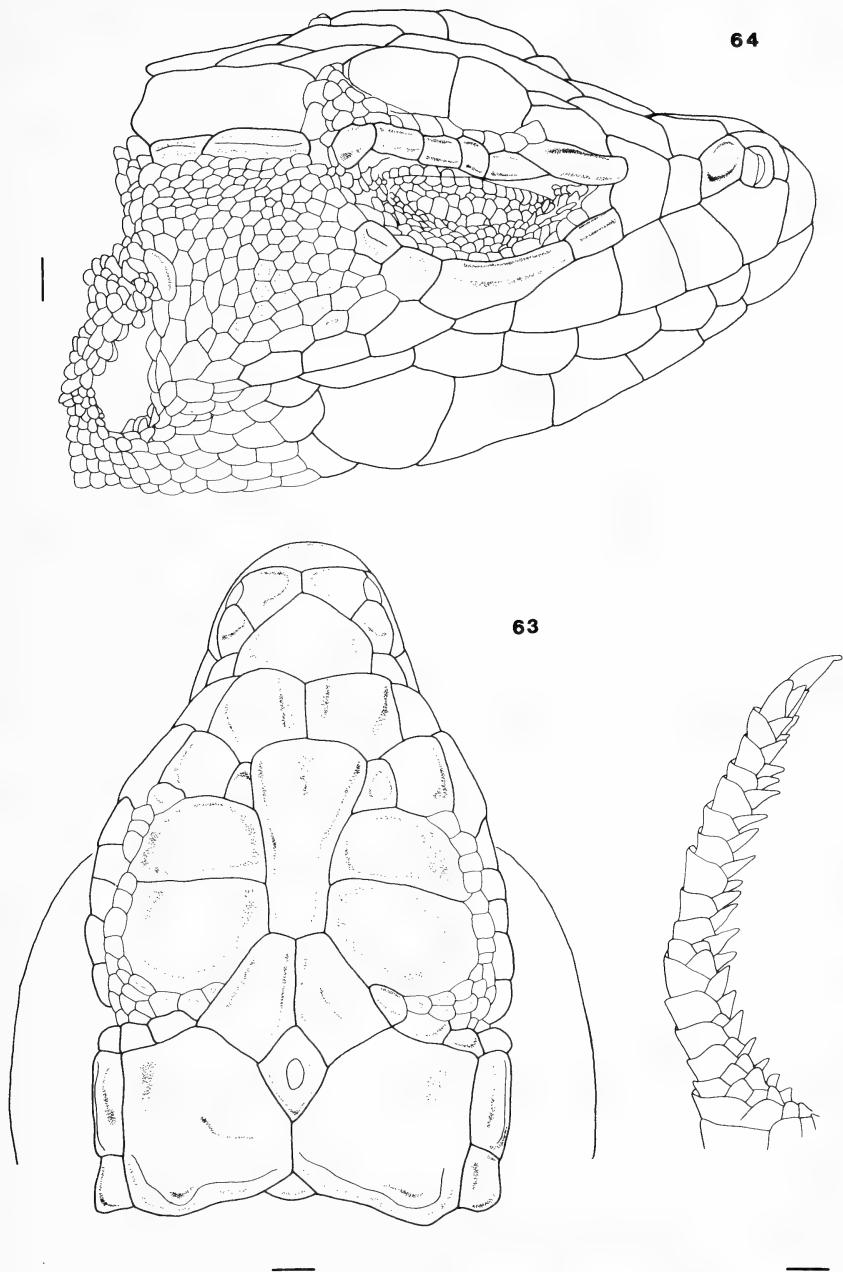
Quariateine—IPC Pipeline, MCZ 56645.

Palmyra, USNM 123733—9, 123742—3, MNHNP 1935.245.

Syrian desert, probably near Palmyra, MCZ 52274, 56441.

#### Iraq

Jebel Enaze, FMNH 11072.



Figs. 63—65. *A. robustus*. Palmyra, Syria. USNM 123735.

### ***Acanthodactylus grandis* Boulenger**

*Acanthodactylus grandis* Boulenger, 1909: 189. Type locality: "Jerud and Ataibé, east of Damascus, and Khan Agach, between Damascus and Kutaifé". Syntypes, BM 1909.4.20.29 (Jerud), MNHNP 23.8—11, BM 1946.9.2.69—70 (Khan Agach).

*Acanthodactylus fraseri* Boulenger, 1918c: 373. Type locality: "Zobeya, Shariba, Lower Mesopotamia". Holotype, BM 1946.8.7.40.

#### **Diagnosis**

Four supraoculars. One row of granules between the superciliaries and the supraoculars. Four supralabials anterior to the subocular. Temporals granular and not keeled. Unpectinate eyelids. Anterior border of ear opening only lightly pectinate. Small dorsal scales.

14 or 16 oblique longitudinal rows of ventrals. Four series of scales on fingers. Lateral pectination scant or completely absent on toes.

#### **Distribution**

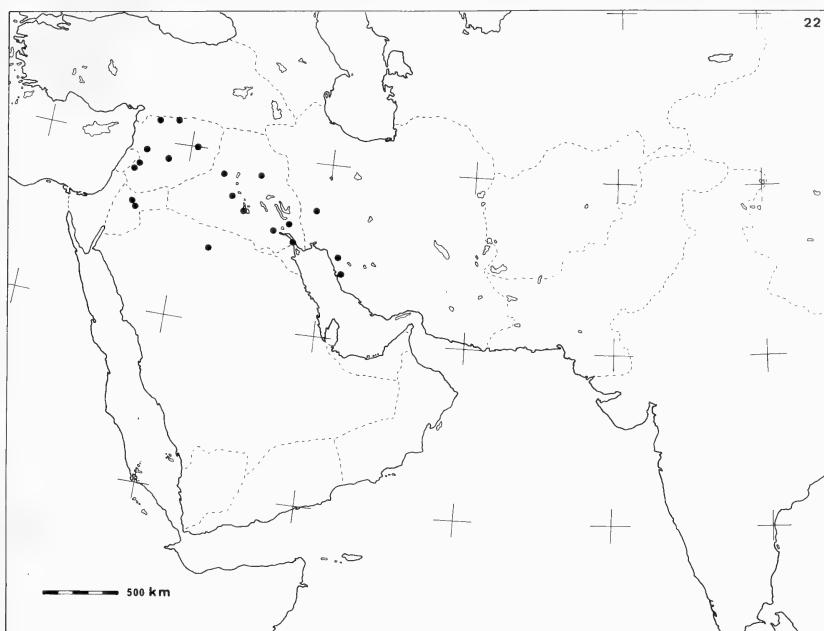
*A. grandis* is found in Jordan, Syria, Iraq, and western Iran. Thanks to a specimen (CM 33531) studied by Haas (1960), we also know it to occur in Badanah in northern Saudi Arabia even though Haas had mistakenly identified it as *A. scutellatus* ssp.

#### **Discussion**

*A. grandis* and *A. fraseri* have been considered two different species since 1921 when Boulenger decided to separate them basing this decision on the keeled posterior dorsals, the 14 longitudinal rows of ventrals, and the lightly pectinate toes in *fraseri*. Actually though, these characters, in addition to others, display a geographic variation from Syria to Iran complicated even further by the processes of isolation caused by changes in river courses and lakes in the Tigris and Euphrates area.

The populations of Syria and Jordan both have a large size, 28 to 35 gulars, 56 to 63 dorsals, and 16 oblique longitudinal rows of ventrals. The color pattern consists of four dorsal rows of large black spots and another very diffused one on each side. On each side of the head there are alternating black and white spots. The populations from Iraq are smaller and only have 26 to 29 gulars, 46 to 59 dorsals, and 14 oblique longitudinal rows of ventrals except for two specimens, one from Jebel Hamrin and one from Nassiriyah, which have 16 rows of ventrals.

The populations from northeastern Iraq are characterized by their small size and very conspicuous and amply reticulate color pattern. The populations from Iran are slender and small with 21 to 30 gulars, 31 to 51 dorsals, and 14 (sometimes 16) rows of ventrals. Their color pattern consists of six rows of indistinct



Map 22. Distribution of *A. grandis*.

black dots. As we go from Syria and Jordan towards Iran, we witness a change in the posterior dorsal scales from smooth to lightly keeled.

### Description

This species is characterized by a large body and a short, wide head. The nasals extend out to the side. The lanceolate concavity running between the frontonasal and the middle of the frontal is only moderately distinguishable. There are four supraoculars, however, the first and fourth are reduced. There is one row of granules between the supraoculars and the superciliaries, which in turn number from five to eight.

The supraocular region is raised. The posterior supratemporal is smaller than the anterior one. Both, however, have a very conspicuous longitudinal keel. The ear opening presents distinct anterior pectination formed by two to five scales. The temporal region is flat and granular. The subocular with its moderately conspicuous keel is either separated from the lip as in the Syrian and Jordanian populations or in contact as in the Iraqi populations. There are four supralabials lying anterior to the subocular.

The first three of the five pairs of submaxillaries are in contact along the center. The gulars, numbering from 22 to 35 down the center, are imbricate. The

collar is rounded and made up of 7 to 11 scales. The ventrals are arranged in 14 of 16 fully oblique longitudinal rows. There is a row of 15 to 24 femoral pores on each side.

The dorsals, numbering from 39 to 64 across the middle of the body, are small, flat, and either smooth or weakly keeled. There are four series of scales on the fingers. The toes are short and have 19 to 25 subdigital lamellae each with one main keel, at times, accompanied by one or two secondary carinae placed to the side. The fourth toe is only scantily pectinate. In Syria and Jordan the scales on the upperside of the tail are small while in Iraq and Iran they are quite large and keeled.

**Color pattern.** The color pattern is very variable but we can say that for the majority in the western region there are six lines of large black dots. In samples from eastern Iraq and northwestern Iran, there is a very patent dark reticulation covering the back.

### Specimens examined

#### Saudi Arabia

Near Badanah (30°39'N, 41°02'E), CM 33531.

#### Jordan

Tell El Mukheizin (32°01'N, 36°33'E), BM 1965.694.

Ain El Enoquiya, BM 1965.692.

#### Syria

Near Khan Ayach (36°40'N, 37°31'E), BM 1946.9.2.69—70, MNHNP 1923.8—11 (syntypes of *grandis*).

Near Jerud (33°49'N, 36°44'E), BM 1909.4.20.29 (syntype of *grandis*).

Dayr Az Zawr (35°20'N, 40°09'E), 3 mi. W of T-2 Station, MCZ 56647, MNHNP 1935.246.

Hims (34°44'N, 36°43'E), Quarantine-Pipeline, MCZ 56644.

Tell Abiad (36°41'N, 38°57'E), MNHNP 1935.230.

Palmyra (34°33'N, 38°17'E), MNHNP 1966.41—4, ZFMK 21018.

#### Iraq

Rawa desert (34°28'N, 41°55'E), BM 1961.1520—1.

Zobeya (30°23'N, 47°43'E), Shariba, BM 1946.8.7.40 (holotype of *fraseri*).

Nassiriyah (31°02'N, 46°16'E), BM 1935.5.12.2.

Road from Baghdad to Falluja, BM 1961.1522—5.

25 km. S of Najaf, BMI 307.

4 km. S of Shthath, Kerbala Liwa, BM (1) not catalogued.

Hafran, Ninevah prov. BMI 372, 920.

Al Uzayr (31°19'N, 47°25'E), Diyala prov. BMI 328.

Jabal Hamrin (34°30'N, 44°30'E), BM (1) not catalogued.

#### Iran

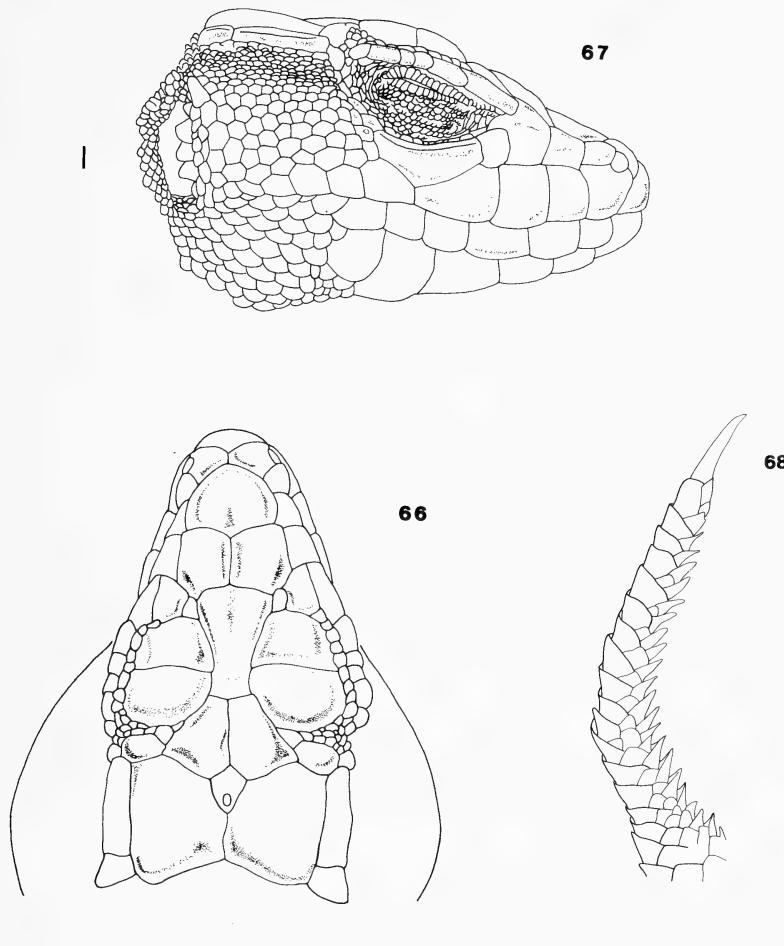
Khash (28°14'N, 61°14'E), MNHNP 1966.45.

12 mi. S of Shush, Khuzistan prov., FMNH 141354, 141356—7, CAS 102535—6.

S of Shush, Khuzistan prov., FMNH 171252.

Near Alchangi, 33 km. NE of Bushire (ca. 28°53'N, 51°02'E), Fars prov., CAS 141143.

Ahran (28°52'N, 51°16'E), Fars prov., FMNH 141479—83, 141485, 141487, 141489—90, 141493, CAS 102531—4.

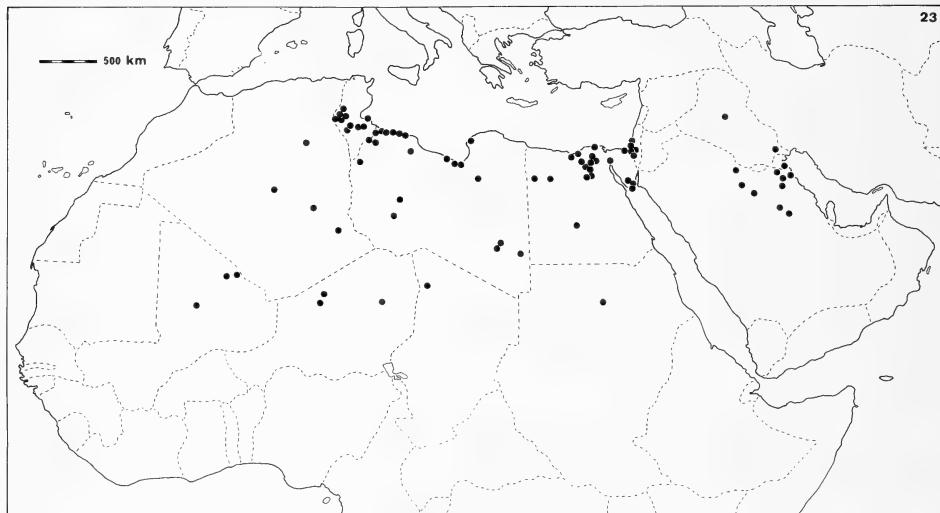


Figs. 66—68. *A. grandis*. Near Jerud, Syria. BM 1909.4.20.29.

### *Acanthodactylus scutellatus* (Audouin)

#### Diagnosis

Elongated pointed snout. Generally three supraoculars. One row of granules between the supraoculars and the superciliaries. Five supralabials anterior to the subocular. Small, keeled temporals. Tympanic scale absent. First three pairs of



Map 23. Distribution of *A. scutellatus*.

submaxillaries in contact. Dorsals small, flat, granular, and weakly keeled in relatively high number. 14 oblique longitudinal rows of ventrals. Fingers with four series of scales. Intense pectination on fourth toe. Reticulate color pattern.

### Distribution

This species occurs in southern Israel, Egypt, Sudan, Libya, Chad, southern Tunisia, southeastern Algeria, Niger, Mali, northern Saudi Arabia, Kuwait, and Iraq.

### *Acanthodactylus scutellatus scutellatus* (Audouin)

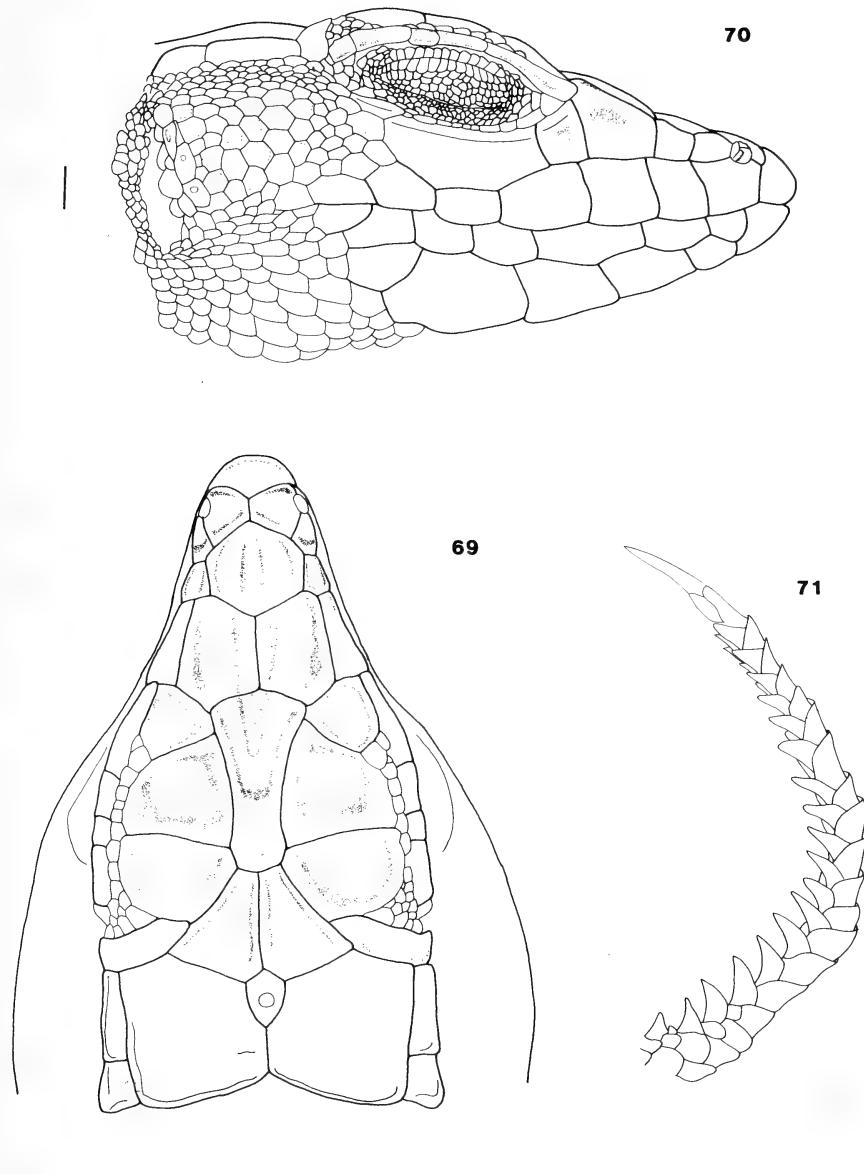
*Lacerta scutellata* Audouin, 1809: 172, pl. i, fig. 7. Type locality: "Egypte". Holotype, not located.

*Scapteira inornata* Gray, 1838: 281. Type locality: "Tripoli". Holotype, BM 1946.9.3.76.

*Acanthodactylus scutellatus* var. *audouini* Boulenger, 1918a: 154. Type locality: "Egypte, Nubie, Tripoli, sud de la Tunisie". Syntypes, BM 97.10.28.315—9 (Wadi Halfa), BM 1913.12.30.6—10 (Homs, Tripoli), BM 91.5.4.85—91 (Duirat, S Tunisia), BM 1920.1.20.3006 (Wed El Kreil, Tunisia).

### Discussion

Included under the typical subspecies are all the populations of northern Africa and Israel despite their great variability. One might argue then that using this same criteria it's no longer possible to maintain the subspecies *hardyi*.



Figs. 69—71. *A. scutellatus scutellatus*. Natron Valley, Egypt. BM 1903.5.28.20—9.

However, as the *hardyi* populations are completely isolated from the others and are uniform in their differentiating characters, we do set them apart as a separate subspecies.

The populations from Israel and the Sinai are similar to those from northern Egypt. Using the Wadi Halfa specimens (*audouini* sensu Boulenger, 1921) as an example, we find that the populations of southern Egypt are, instead, relatively large with more than 70mm. snout—vent length, have dorsals more keeled and a little larger than the laterals numbering from 56 to 61, and have a sharply pectinate fourth toe. These characters are especially pronounced in a sample from Dongola, Sudan.

For all of these populations, the ventrals are arranged in 14 oblique longitudinal rows. In samples from the Kufra oasis in Libya, the dorsals are sharply keeled. The coastal populations from Libya and southern Tunisia vary very little from the Egyptian populations except for the sharply keeled dorsals mentioned above for Libya. I also include in this subspecies the specimens from In Salah in the middle of the Algerian Sahara and the samples from Chad, Niger, and Mali.

### Description

*A. s. scutellatus* is characterized by a medium-sized, slender body and a pointed snout. The hindlegs are relatively long although to a lesser degree than in *A. longipes*. The lanceolate concavity extending from the frontonasal to the middle of the frontal is very well pronounced. The nasals protrude upwards and out to the side, with a relatively short suture between them. There are three supraoculars. What was originally the fourth is now confined to the posterior section with the space in front filled with granules.

There is usually only one row of granules between the supraoculars and the superciliaries. There are six to eight supralabials lie anterior to the subocular. The subocular with a very distinct keel bordering the orbit does not make contact with the upper lip but joins with the 5th and 6th supralabial. The supratemporals, the anterior one larger than the posterior one, both have a very conspicuous longitudinal central keel. The temporals are small and keeled. No tympanic scale is present. The anterior border of the ear opening is lightly denticulated by 3 to 5 scales.

The first three of the five pairs of submaxillaries make contact in the center. The gulars, numbering from 26 to 39, are large and imbricate. A gular fold is distinguishable. The dorsals, numbering from 57 to 87 across the midbody, are small, granular, weakly keeled, and equal in size to the laterals. There are 14 oblique longitudinal rows of ventrals which meet together at the bottom forming a v-shape. There are four series of scales on the fingers. The fourth toe is strongly pectinate with 21 to 28 unicarinate lamellae on its underside. The scales

on the upper surface of the tail have diagonal keels. There are 16 to 26 femoral pores on each side of the body.

Color pattern. Adults usually display inconspicuous reticulation. In young specimens there are two white bands on each side and a blue tail.

### **Specimens examined**

#### **Tunisia**

- 22 km. SW of Metlaoui, UCM 36900, 36904—11, 36913, 36915, CM 54552—3.
- 20 km. SW of Metlaoui, UCM 36868, 36870—8.
- 20 km. SW of Metlaoui, in the dunes of Oued Gifla, UCM 36879—94.
- 43 km. W of Gafsa at Bled Douarah, UCM 48080.
- 26.5 km. E and 5 km S of Medenine, CM 56494—5.
- 25 km. SE of Douz on the road to Ksar Rhilane, CM 56553.
- 25.6 km. E and 4.6 km. S of Medenine, CM 56522—6.
- 28.2 km. E and 6 km. S of Medenine, CM 56740—6, 56731—9, 56722—29, 56715—21, 56698—705, 56693(12), 56692, 56622, 56619—21.
- Duirat (32°52'N, 10°17'E), BM 91.5.4.85—91.
- Ued El Kreil (33°03'N, 10°03'E), BM 1920.1.20.3006.
- S of Gafsa, BM 96.2.29.3.
- Kebili (33°42'N, 8°58'E), MNHNP 85.209—13.
- Gde. Ile Keneiss (34°22'N, 10°19'E), MNHNP A 768.
- Nefta (33°52'N, 7°53'E), CAS 132752—5.
- Tozeur (33°55'N, 8°08'E), CAS 138969.
- 23 km. E of Tozeur on the road to Gafsa, CAS 138964—7.
- 5 km. SW of Gafsa, CAS 127484.

#### **Algeria**

- In Kelmet, Hoggar, ZFMK 22792—3.
- 30 km. N of Amguid, Hoggar, ZFMK 22794.
- In Salah (27°13'N, 2°28'E), BM 1912.11.9.64—6.
- Tahihaout, Hoggar, ZFMK 22801—3.
- Amguid (26°26'N, 5°22'E), MNHNP 1932.131, ZFMK 22795—8.
- Irr Err Err, 50 km. N of Ideles, Hoggar, ZFMK 22800.
- Oued Roufat (24°53'N, 8°28'E), Tassili, MNHNP 1936.74.
- Oued Tegert, Hoggar, ZFMK 22799.

#### **Libya**

- Tripoli, BM 1946.9.3.76 (holotype of *S. inornata*), MCZ 22348—51, MNHNP 1976.369—70, BM 1955.1.8.58—60, ZFMK 22820—2.
- Tripoli, 5 mi. from the coast, USNM 148485.
- Gialo (29°02'N, 21°33'E), Cyrenaica, BM 1932.3.6.9—10.
- Homs (31°20'N, 14°10'E), Tripolitania, BM 1965.1129.
- Grasr Garabali (32°45'N, 13°43'E), Tripolitania, BM 1965.1283.
- Zuaria (32°56'N, 12°06'E), BM 1965.1282.
- Brega (30°25'N, 19°36'E), Cyrenaica, BM 1965.1268—73, BM 1965.1277.
- 50 km. N of Hon, Tripolitania, BM 1954.1.6.38—40.
- 80 km. E of Ghadames, Tripolitania, BM 1954.1.6.31—7.
- Homs, Tripolitania, BM 1913.12.30.6—10.
- Gargaresc (32°53'N, 13°06'E), Tripolitania, BM 1954.1.6.45—60, 1954.1.6.10—30.
- Wadi Harana (31°37'N, 11°53'E), Tripolitania, BM 1965.1279—81.
- Jebel Fezzan (26°00'N, 14°00'E), BM 1965.1285—6, BM 1945.11.9.8.
- Sebha (27°02'N, 14°26'E), Fezzan, BM 1954.1.6.41.

Kufra (24°10'N, 23°15'E), BM 1975.1230—6, BM 1932.3.6.12, BM 1975.1229.

Demara (30°23'N, 18°14'E), BM 99.9.5.6.

Zuara (32°56'N, 12°06'E), Tripolitania, BM 1955.1.8.61—2.

Sidi Benour (32°48'N, 13°36'E), 40 km. E of Tripoli, BM 1954.1.6.43—4.

Benghazi (32°07'N, 20°04'E), Cyrenaica, BM 1965.1278.

Zuaria, Tripolitania, BM 1965.1130.

Maamura (32°43'N, 12°53'E), Tripolitania, BM 1955.1.8.63.

14 km. S of El Habilia, Tripolitania, BM 1955.1.8.64.

G. Garabulli, Tripolitania, BM 1955.1.8.65.

Bescer (30°18'N, 19°25'E), Cyrenaica, BM 1965.1274—6.

Gorge, 12 mi. SE of El Agaba, Gilf Kebre (23°18'N, 25°52'E), BM 1955.1.1.46—7.

Buma (24°12'N, 23°20'E), Kufra, BM 1932.3.6.8.

Nalut (31°52'N, 10°59'E), BM 1975.1208—9.

Castel Benito (32°41'N, 13°11'E), Tripolitania, BM (3) not catalogued.

Ain Zara (32°49'N, 13°16'E), near Tripoli, BM (5) not catalogued.

Mourzouk (25°55'N, 13°55'E), Fezzan, BM 1956.1.1.8.

### **Sudan**

Dongola (19°10'N, 30°29'E), BM 1924.5.21.3.

Kosti, ZFMK 22851.

Amada, ZFMK 22852—9.

### **Mali**

Tamesna (18°25'N, 3°33'E), BM 1970.2395.

20°12'N, 1°11'W, BM 1975.1396.

20°31.5'N, 0°3.2'E, BM 1975.1397.

### **Niger**

Adrar Bouss (08°40'E, 20°N), Air, BM 1970.1758.

N of Zéline Puits (19°14'N, 7°31'E), MNHNP 1936.76.

Bilma oasis (18°41'N, 12°56'E), MNHNP 1919.106—7.

### **Chad**

Zouarke (20°25'N, 16°05'E), SW Tibesti, BM 1962.290.

### **Egypt**

Liberation, 3 mi. N of Kafr Dawud, USNM 134907.

Desert N of Birkel-el Kurum, Fayum, AMNH 1781, 1785.

15 km. N of Birket Qarum, 34 km. W of El Fayum, MCZ 83207.

K-121 on the Cairo—Alexandria road, 21 mi. NW of Wadi Natrun, MCZ 46841.

Shamama Halt (30°49'N, 29°05'E), halfway between El Alamein and El Hammam, MCZ 46846—7.

Burg El Arab (30°55'N, 29°32'E), USNM 135326, 135328.

Wadi Natrun (30°25'N, 30°13'E), USNM 131315, 135434.

2 mi. E of Sakkara, USNM 130577—80.

Sakkara (30°23'N, 30°25'E), As Sahra Al Gharbiyah, USNM 130564—5.

Natron Valley, USNM 37272.

Wadi Natrun, USNM 149504—5.

Dakla Oasis, Moot (23°30'N, 29°10'E), As Sahra al Janubiyah, USNM 149506.

15 mi. W of Cairo, USNM 136362—3.

10 mi. E of Heliopolis, USNM 130618—20.

15 km. S of Maadi, USNM 130421.

5 mi. E of Heliopolis, USNM 124706.

Near Giza pyramids, USNM 136476.

5 mi. NW of Giza pyramids, USNM 124729.

Abu Rawash, USNM 130852, 130860—5, 130898, 133330, 136255—64.

Lisht (29°34'N, 31°15'E), near Matarieh, USNM 39124—6.  
 Baltim (31°33'N, 31°05'E), USNM 130401—2, 136331.  
 3 mi. NW of Fayid, USNM 124711.  
 El Arish (31°09'N, 33°49'E), USNM 133498—502.  
 Sibalya, S of Luxor, ZFMK 22823.  
 Cairo, BM 90.6.21.5—7, 1920.1.20.3458, 1920.1.20.3357, ZFMK 22824.  
 Mokhatan Mts., Cairo, ZFMK 22826—30.  
 Giza, BM 97.10.28.303—12, ZFMK 22825.  
 Fayoum, BM 97.10.28.313—4.  
 Moses Wells, Suez, BM 97.10.28.302.  
 Isthmus of Suez, E of the canal, BM 97.10.28.297—301.  
 Wed Hebron, Mt. Sinai, BM 82.8.16.6—7.  
 Mohammadieh (27°44'N, 34°15'E), Sinai, BM 1927.8.12.34—5.  
 Sakkara desert, 16 mi. from Cairo, BM 1928.9.1.20.  
 Ain Nouamissa (28°42'N, 26°44'E), BM 1938.8.4.32.  
 Siwa (29°4'—29°30'N, 25°7'—26°E), BM 1938.8.4.33—6.  
 MECS Camp, N Egypt, BM 1974.5267.  
 Kafr El Elm, BM 1974.5268.  
 Wadi Garawi (29°47'N, 31°19'E), BM 1974.5269—70.  
 Between Ain Musa and Wadi Sidr, Sinai, ZFMK 22831.  
 Wadi Werdan, Sinai, ZFMK 22832.  
 Wadi Gharandal, Sinai, ZFMK 22833—42.  
 Omayed (28°37'N, 34°34'E), BM 1976.1724.

#### **Israel**

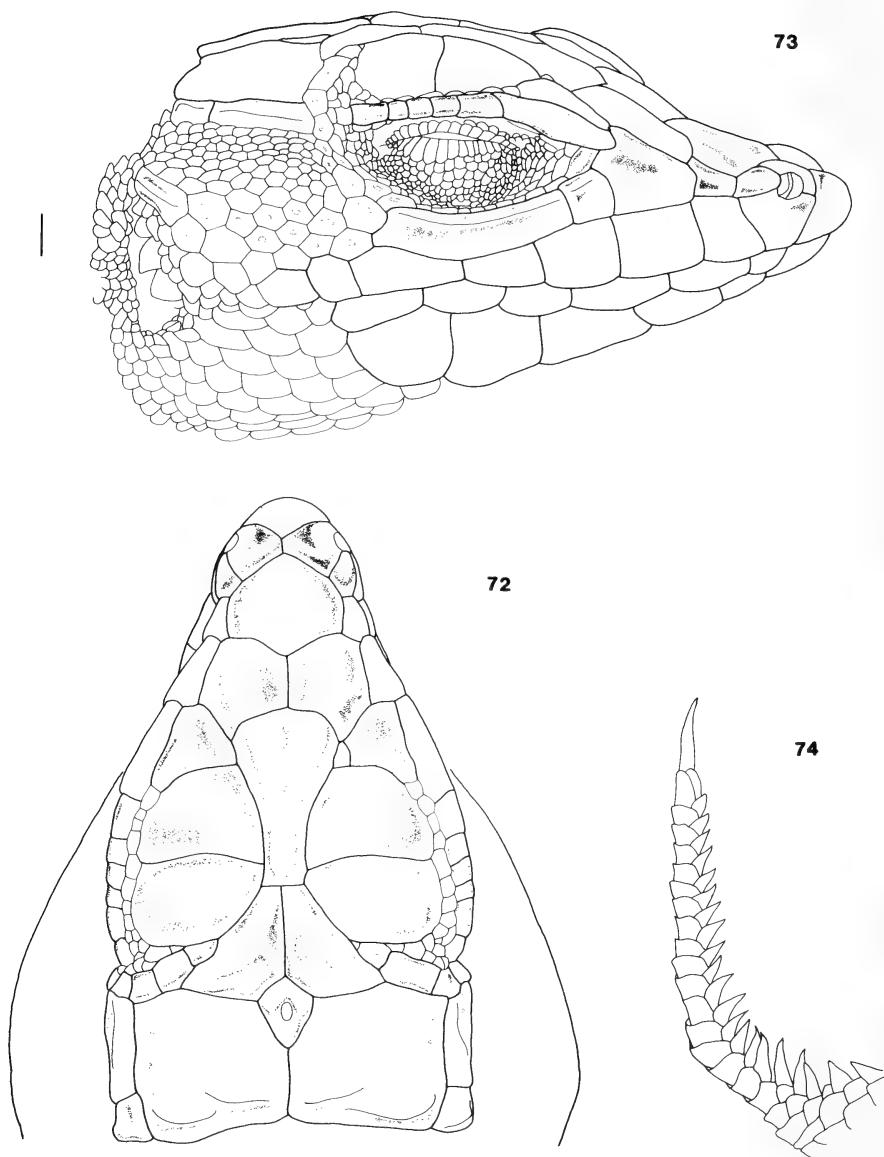
Hamerkaz (31°58'N, 34°48'E), 3 km., 40°W of Rishon Zion, UF 14767(3), 14782, 21113.  
 Tel Aviv, AMNH 58815—7, ZFMK 7105.  
 Tel Aviv, sand dunes SE of Holon, UF 13912(2), 13913, 13914(8), 13915(9), 14865, 14866(9),  
 14867, 14781.  
 Holon, on the coastal plain near Jaffa, MCZ 52273.  
 10 mi. S of Tel Aviv, CM 43805.  
 Bir Asluj (31°01'N, 34°46'E), MVZ 97517—8, 97520.  
 Mashabey Sadeh (31°00'N, 34°47'E), MVZ 97519.  
 Near Askalon, sand dunes halfway between the beach and Sheik'Awad, MCZ 56443.  
 Beersheva (31°14'N, 34°47'E), MCZ 96828.  
 14 km., 172°W of Beersheva, UF 14868(3).  
 19 km., 126°W of Beersheva, UF 14869(3).  
 Dunes of Haluza (31°05'N, 34°28'E), CM 50963—5.  
 Jaffa, BM 62.8.13.23—7.  
 Jerusalem, BM 62.8.13.14—5, 62.8.13.17.  
 Holan, BM 1952.1.4.73.  
 Near Tel Aviv, BM 1952.1.4.74—6.  
 Haifa, BM 1954.1.1.46.  
 N of Revivim, Negev, BM 1959.1160.

#### ***Acanthodactylus scutellatus hardyi* Haas**

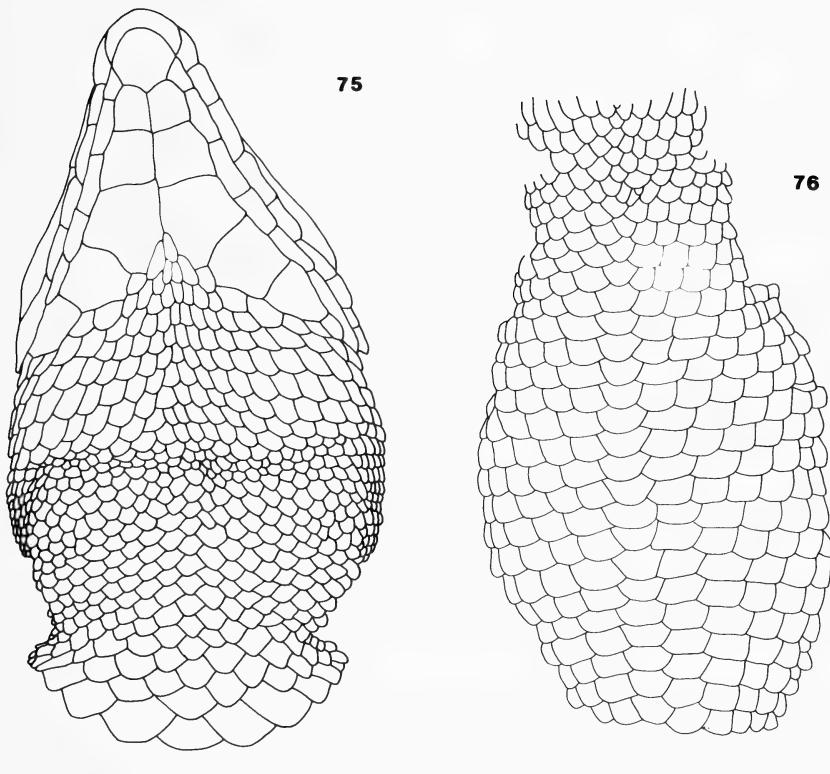
*Acanthodactylus scutellatus hardyi* Haas, 1957: 72. Type locality: "Hirmas Station, Saudi Arabia". Holotype, Hebrew University of Jerusalem No. 2682.

#### **Diagnosis**

Smaller than typical subspecies. Relatively wider head with nasal regions



Figs. 72—76. *A. scutellatus hardyi*. Jawud Khan, Saudi Arabia. BM 1947.3.2.8—14.



more raised. Larger gulars. Fragmented fourth supraocular. 12, sometimes 14, almost straight longitudinal rows of ventrals. Dorsals flat, granular, and never keeled. Temporals large and flat.

### **Distribution**

This subspecies occurs in northern Saudi Arabia, Kuwait, and Iraq. Haas & Werner (1969) reported it from Lake Habbaniyah in Iraq.

### **Discussion**

Haas (1957) based his description of *hardyi* on only one specimen from Hirmas Station near Tebuk, northwestern Arabia. Haas & Werner (1969) confirmed this first description after studying three more specimens from lake Habbaniyah, Iraq. We can deduce from the material examined that *hardyi* is a well-differentiated subspecies uniform in its distinctive features.

I have not been able to find any intermediate populations between *A. s. hardyi* and *A. s. scutellatus* from Israel and the Sinai. Boulenger (1921) reported a specimen from Basra, Mesopotamia to be a member of the typical subspecies. I have examined this specimen (BM 1919.12.19.1) and found it to coincide with the diagnosis of *hardyi* except for its 14 rows of ventrals. Nevertheless, these rows are almost straight as in *hardyi*.

### **Specimens examined**

#### **Saudi Arabia**

Jawad Khan, 100 mi. W of Hofuf, BM 1947.3.2.5—7.  
 Tawil Well ( $21^{\circ}14'N$ ,  $52^{\circ}16'E$ ), BM 1947.3.2.15—18.  
 $28^{\circ}50'N$ ,  $43^{\circ}45'E$ , BM 1964.108—21.  
 $28^{\circ}30'N$ ,  $47^{\circ}80'E$ , BM 1964.124—6.  
 $27^{\circ}25'N$ ,  $44^{\circ}20'E$ , BM 1964.122.  
 $29^{\circ}20'N$ ,  $48^{\circ}00'E$ , BM 1964.123.  
 Qariya ( $27^{\circ}33'N$ ,  $47^{\circ}40'E$ ), BM 1964.127.  
 Rumaihiya ( $25^{\circ}30'N$ ,  $47^{\circ}05'E$ ), BM 1964.129.  
 125 km. E of Hafar Al Batin, BM 1969.754.  
 Jarrab ( $26^{\circ}45'N$ ,  $45^{\circ}00'E$ ), BM 1970.2078.

#### **Kuwait**

Kuwait, BM 1972.361.  
 City of Kuwait, BM 1970.1928—39.

#### **Iraq**

Basra ( $30^{\circ}30'N$ ,  $47^{\circ}47'E$ ), BM 1919.12.19.1.  
 Lake Habbaniyah ( $13^{\circ}17'N$ ,  $43^{\circ}29'E$ ), MCZ 56650—2.

### ***Acanthodactylus aureus* Günther**

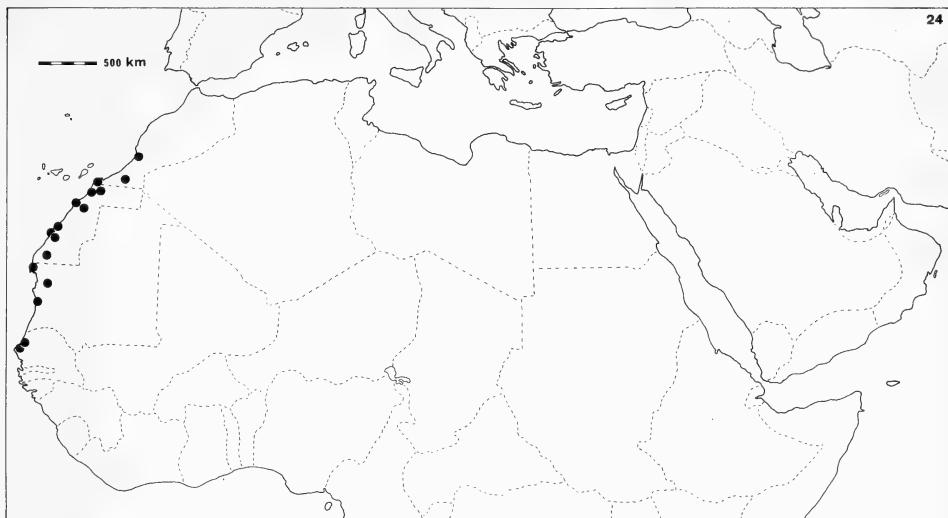
*Acanthodactylus scutellatus aureus* Günther, 1903: 298. Type locality: "Rio de Oro, Western Sahara". Syntypes, BM 1946.8.5.2—26, USNM 33109—11, MNHNP 1918.11—2.

### **Diagnosis**

Medium-sized, slender body. Sharply pointed snout. Four supralabials anterior to the subocular. Four entire supraoculars. Temporals keeled. Low number of dorsals. 14 oblique longitudinal rows of ventrals. Four series of scales on fingers. Row of granules between the supraoculars and superciliaries usually absent, at times one. Third pair of submaxillaries separated or only partially in contact. Reticulate color pattern.

### **Distribution**

This species is found along the coastal regions of southern Morocco, Rio de Oro, Mauritania, and Senegal. Salvador & Peris (1975) discussed the status of this form.



Map 24. Distribution of *A. aureus*.

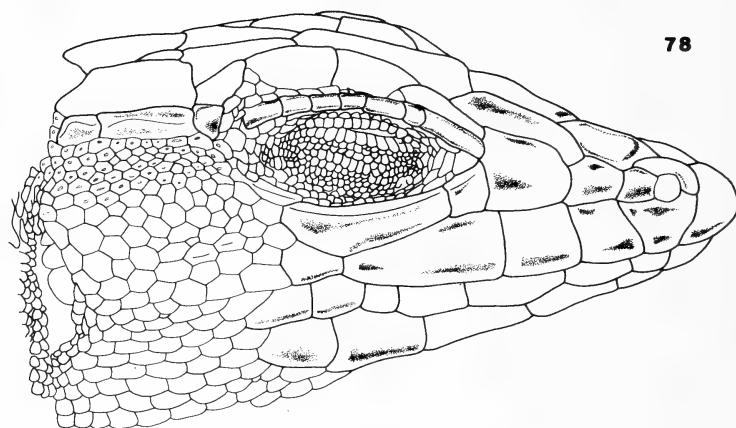
## Discussion

*A. aureus* is isolated from the other species of the *scutellatus* group with the exception of *A. dumerili* with whom it is found in sympatry in northern Mauritania and Río de Oro. Even though it is separated from *A. scutellatus* by the *dumerili* populations, it seems to be most like the former.

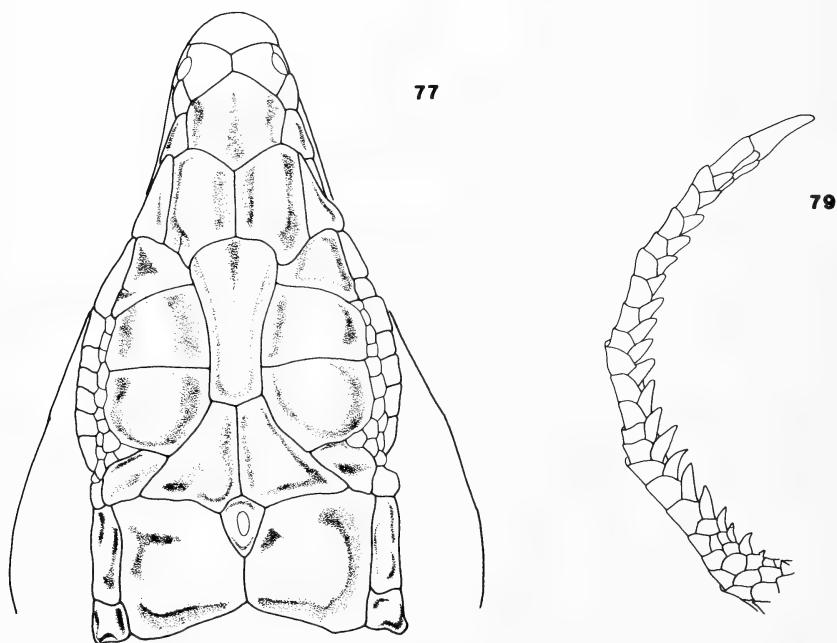
Some specimens from Fort Gouraud in Mauritania present a peculiar combination of characters. Their color pattern corresponds to *aureus*. Their dorsals are very large and keeled while the ventrals are arranged in 14 rows. There are four entire supraoculars as we find in *aureus*. These specimens lead us to suspect that *aureus* is not only a coastal species but also reaches as far inland as Fort Gouraud where it is found in sympatry with *A. dumerili*.

Recently, I was able to examine the specimens collected by J. A. Valverde and his collaborators and deposited in the Estación Biológica de Doñana in Sevilla. This collection clearly shows that *aureus* and *dumerili* are two different species since no intermediate populations were found. We also see that although *aureus* is predominantly a coastal species, it is found in very limited numbers in the interior; as we go further east it is substituted by *dumerili* populations. The *dumerili* populations coincide with those from northern Mauritania in that they, too, are intermediate between the typical subspecies and *A. d. exiguum*.

A clinal variation in body size has been found in *aureus*. In fact, the snout-vent length increases descending to the south.



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Figs. 77—79. *A. aureus*. Villacisneros, Río de Oro. BM 1946.8.5.22.

## Description

This species is characterized by a medium-sized body and a long sharply pointed snout. The lanceolate concavity extending from the frontonasal to the middle of the frontal is well developed. The suture between the nasals is neither short nor long. There are four entire supraoculars with the fourth one, at times, divided into two. There is usually no row of granules between the supraoculars and the superciliaries; however, at times one may be present.

Four supralabials, the fourth one very large and elongated, lie anterior to the subocular. The subocular, wedged between the fourth and fifth supralabial, has a well-defined keel and is separated from the upper lip. The two supratemporals are approximately the same size or the anterior one may be a little larger. Both have a very pronounced longitudinal keel. The temporals are small and keeled. The eyelids are moderately pectinate. There is no tympanic scale.

The upper anterior border of the ear opening is pectinated by two or three scales. The first three of the five pairs of submaxillaries are rarely in contact; however sometimes contact up to the middle of the third is present. The gular fold is only slightly conspicuous. The collar is rounded. The dorsals, numbering from 42 to 58 across the midbody, are flat and keeled. The ventrals are arranged in 14 oblique longitudinal rows. There are 21 to 26 femoral pores on each side of the body.

The fingers display four series of scales. The fourth toe is intensely pectinate and presents 21 to 24 subdigital lamellae.

Color pattern. The coloration is yellow or green with black reticulation. Females have four dorsal lines of white dots. The tail is blue.

## Specimens examined

### Rio de Oro

Villa Cisneros ( $23^{\circ}42'N$ ,  $15^{\circ}56'W$ ), BM 1946.8.5.2—26, USNM 33109—11, MNHNP 1918.11—2 (syntypes of *aureus*), AMNH 17802—8, MNHNP 1939.167, EBD 7220, 2456.

Aguerguer, Guerguerat ( $21^{\circ}30'N$ ,  $16^{\circ}50'W$ ), MNHNP 1937.9.

El Argoub ( $23^{\circ}37'N$ ,  $15^{\circ}52'W$ ), MNHNP 1938.187—8.

La Sarga, Villacisneros, EBD 6457—8.

Udei-Taamia, EBD 2450.

Roque Cabrón, Villacisneros, EBD 2223.

Taguarta, Villacisneros, EBD 6459—74, 6484—507, 6481, 6483, 6480, 6475—6, 6478, 6482.

Tafudart, Seguiat el Hamra, EBD 2452.

Puerto Rico, El Aargub, EBD 2446—8.

Agli Ben Ali, S of Zenin, EBD 2443.

Samlat Achit, EBD 2449.

El Aaium, EBD 3635, 7055, 7077.

El Meseied, EBD 3615.

Metmarfag, EBD 3616.

Cabo Jubi, EBD 2444—5, BM 89.12.16.45—9.

Batarja, Villacisneros, EBD 2438.

Imililik, EBD 2451.

Tiniguir, EBD 7231—2.

Villacisneros cemetery, EBD 7227—8.

10 km. N of Cabo Bojador, EBD 2459.

Faro El Ciprés, Villacisneros, EBD 7222.

La Guera, EBD 7224—5.

12 km. S of Bucraa, EBD 7054.

#### **Mauritania**

Port Etienne (20°54'N, 17°04'W), BM 1936.6.14.6—19, BM (1) not catalogued, MNHN P 1923.160—5, 1937.76—7.

Between Akjoujt and the ocean, MNHN P 1937.47.

Nouadhibou (17°58'N, 15°21'W), CAS 134558—65.

#### **Senegal**

Mboro-sur-mer, ZFMK 17430—2, 17454.

Lompoul (15°27'N, 16°41'W), MNHN P 1962.91, 1962.93, 1962.87, 1962.80, 1962.78, 1962.76, 1962.74.

Malika (14°48'N, 17°20'W), MNHN P 1962.96.

#### **Morocco**

1 km. S of Aoreora, LACM 108947—58.

Outskirts of Agadir, ZFMK 25771—825, 16078—82.

Inezgane, Agadir, ZFMK 18870—2.

### ***Acanthodactylus dumerili* (Milne Edwards)**

#### **Diagnosis**

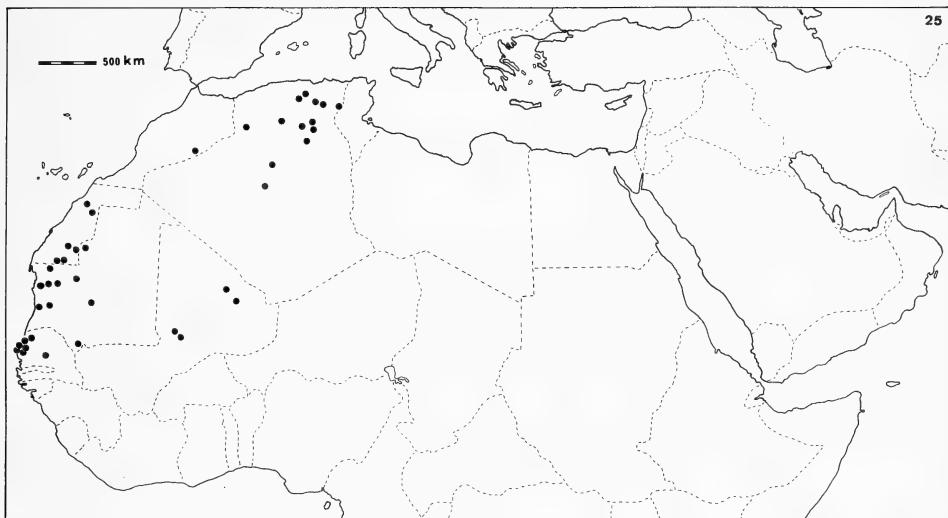
Small species with short, blunt snout. Five supralabials anterior to the subocular. Subocular not in contact with the upper lip. Ventrals arranged in 12 or 14 longitudinal rows. Fourth supraocular divided. Dorsals flat, large and sharply keeled. One or two rows of granules between the supraoculars and the superciliaries. Color pattern very faint or completely absent.

#### **Distribution**

This species occurs in Senegal, Mauritania, Rio de Oro, southern Morocco, and Algeria. Recently Böhme (1978) reported it from numerous localities in Senegal.

#### **Discussion**

*A. dumerili* is considered a separate species distinguished from the other species of the *scutellatus* group for the following reasons. No intermediate populations nor signs of hybridization between *dumerili* and *aureus* in northern Mauritania and Rio de Oro have been found. The *A. dumerili* populations of Algeria and Mauritania should be considered conspecific since there are intermediate populations in northern Mauritania and throughout Rio de Oro.



Map 25. Distribution of *A. dumerili*.

Specimens examined from these last two areas have large, flat, and keeled dorsals while the rows of ventrals vary between 12 and 14 and are straighter than in *exiguus*. The color pattern is also intermediate with some having reticulation and others having more or less conspicuous bands. In a series from Akjoujt, the color pattern and the large keeled dorsals are definitely *dumerili* whereas the longitudinal rows of ventrals, although they vary from 12 to 14, are as yet not straight. In the specimens from Nouakchott, however, we already find the ventrals arranged in 12 straight longitudinal rows. In the specimens from Atar and in those from Fort Gouraud these characters vary considerably.

### Description

*A. dumerili* is characterized by a small body, a short blunt snout, and relatively long hindlegs. The lanceolate concavity running between the frontonasal and the middle of the frontal is only barely distinguishable. The nasals are slightly raised. There are three supraoculars. What used to be the fourth one is now generally fragmented. Either one or two rows of granules between the supraoculars and the superciliaries may be present.

The eyelids are moderately pectinate. Five supralabials lie anterior to the subocular. The subocular, wedged between the fifth and sixth supralabial, has a distinct keel bordering the orbit and is separated from the upper lip. There is one large supratemporal followed by a small one. Both have a longitudinal keel. The temporals are keeled. The anterior border of the ear opening is lightly denticulate.

The first three of the five pairs of submaxillaries make contact along the center. The gular scales are large and only slightly imbricate. The dorsals, numbering 38 to 55 across the midbody, are flat, sharply keeled, and larger than the laterals. The ventrals are arranged in 12 or 14 longitudinal rows. There are four rows of scales on the fingers. The fourth toe is only moderately pectinate and has 19 to 22 lamellae on its underside.

Color pattern. The overall coloring is gray or reddish brown with three dark dorsal bands plus two on each side of the body in the typical subspecies. In *exiguus*, the color pattern is slightly reticulate with females having a pale band on each side of the body.

### ***Acanthodactylus dumerili dumerili* (Milne Edwards)**

*Lacerta dumerili* Milne Edwards, 1829: 85, pl. vii, fig. 9. Type locality: "Senegal". Holotype, MNHNP 2759.

*Acanthodactylus senegalensis* Chabanaud, 1918: 162. Type locality: "Sangaleam, près de Rufisque". Holotype MNHNP 1918.43.

### **Diagnosis**

Ventrals arranged in 12 straight longitudinal rows. Relatively longer hindlegs. Fourth supraocular usually divided. Two rows of granules between the supraoculars and the superciliaries.

### **Specimens examined**

#### **Mauritania**

Trarza country, BM 1913.5.9.16—35.

Nouakchott, BM (4) not catalogued.

Tidjikja (18°33'N, 11°25'W), BM (1) not catalogued.

Between Akjoujt and the ocean, MNHNP 1937.45—6.

Tasiast, Oglia de Tamarat (21°02'N, 15°15'W), MNHNP 1937.7.

Cape Timiris, El Mamghar (19°23'N, 16°32'W), MNHNP 1937.8.

5 km. N of Nouakchott, CAS 134627.

15 km. N of Nouakchott, CAS 134599—602, 134604—8, 134610—1, 134616—20.

Lake Houï beach (15°28'N, 12°03'W), BM (1) not catalogued.

#### **Senegal**

Dakar, BM 83.4.14.1—2, BM (8) not catalogued, MNHNP 1920.123.

Dakar-Pikine, ZFMK 17499—507.

Leybar (15°58'N, 16°29'W), BM 1920.1.20.3412.

Cape Vert (14°43'N, 17°28'W), BM 72.12.13.3—4, CM 23743.

Outskirts of Dakar, BM (5) not catalogued, CM 24792—4, 24745—6, 24733, 24707.

Between Kayr and Bayakh, ZFMK 20158.

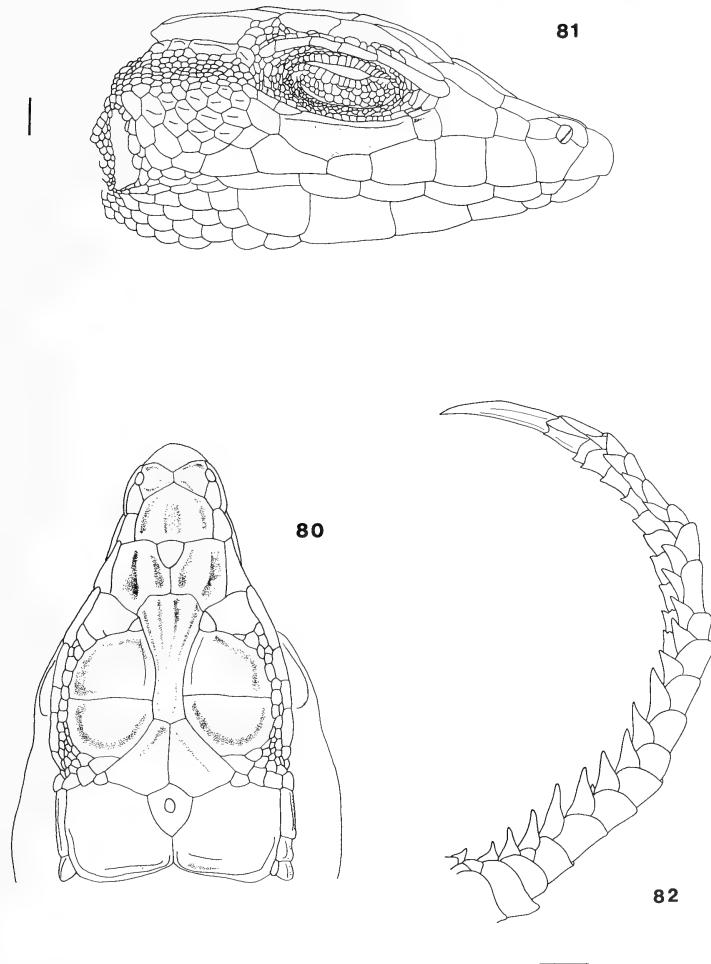
Kayar (14°55'N, 17°07'W), BM (1) not catalogued.

Nianing, ZFMK 17508—20.

Lompoul (15°27'N, 16°41'W), MNHNP 1962.69—73, 1962.75, 1962.77, 1962.79, 1962.81—6, 1962.88—90, 1962.92, 1962.99.

20 km. S of Richard Toll, ZFMK 17468—84.

Somone (14°29'N, 17°05'W), MNHNP 1962.92, 1962.95.



Figs. 80—82. *A. dumerili dumerili*. Trarza Country, Mauritania. BM 1913.5.9.0.

Ndioum, ZFMK 17485—91.

M'Boro ( $13^{\circ}42'N$ ,  $14^{\circ}10'W$ ), MNHNP 1962.94, 1962.100, ZFMK 17433—53, 17455—67.  
10 km. W of Linguère. ZFMK 17492—8.

Malika ( $14^{\circ}48'N$ ,  $17^{\circ}20'W$ ), MNHNP 1962.97—8, 1962.101—4, MNHNP 1978.1478—517,  
ZFMK 20159—63.

Niakoul Rap, ZFMK 20148—52.  
Cambérène, ZFMK 20153—7.

**Mali**

Ahanko (20°N, 1°E), BM 1970.2397.  
 19°30'N, 00°30'W, BM 1970.2396.  
 M'Boussa (16°41'N, 3°58'W), Faguibine lake, MNHNP 1932.11.  
 Goundam (16°25'N, 3°40'W), MNHNP 1932.8—9.

**Specimens intermediate between *dumerili* and *exiguus*****Mauritania**

Fort Gouraud (22°41'N, 12°43'W), BM (18) not catalogued.  
 Akjoujt (19°45'N, 14°23'W), BM (12) not catalogued.  
 Tzougui, Atar, BM (2) not catalogued.  
 Atar (20°31'N, 13°03'W), BM (15) not catalogued.

**Rio de Oro**

Ausert, EBD 6508—12.  
 S of Zemmur, EBD 2458.  
 Entayat, EBD 2439.  
 Sebja Uled Salad, EBD 3613—4.  
 Tichla, EBD 6515—21, 6522.  
 10 km. N of Aguenit, EBD 7221.  
 Ued Mehariz, EBD 2453—4.  
 30 km. SW of Ausert, EBD 6513—4.  
 Zug, EBD 2455.  
 Uad Ermina, EBD 2457.  
 4 km. N of Bubufa, EBD 6523.  
 Udei Taamia, EBD 2450.  
 Lemraigenat, EBD 5187.

***Acanthodactylus dumerili exiguus* Lataste**

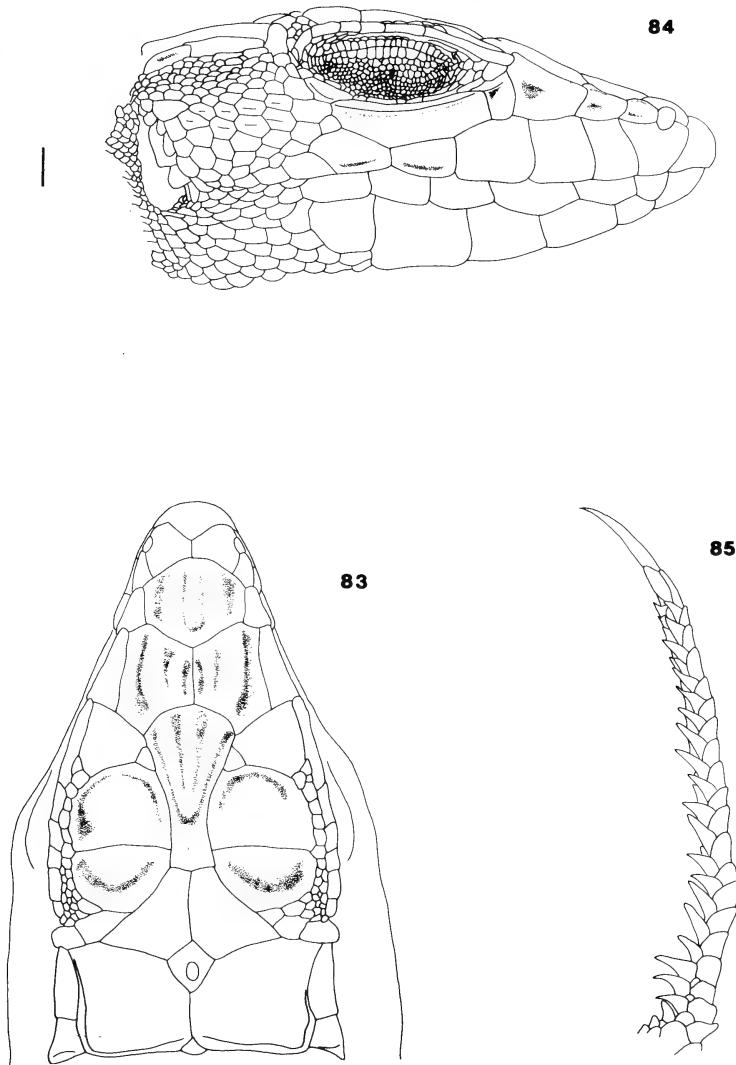
*Acanthodactylus scutellatus* var. *exiguus* Lataste, 1885: 493. Type locality: “En Algérie, à Biskra, Mraier, Tougourt, Bled Ahmar, Hadjira, N’Gouça, Tilremt, Laghouat, Ain el Hel et Bou-Saada. En Tunisie, à l’ouest el Kreil, Kebili, Tozeur, et Nefta”. Syntypes, not catalogued, but probably BM 1920.1.20.1349c (Bled Ahmar), 1920.1.20.1349 (Hadjira), 1920.1.20.1349d (Tilremt), 1920.1.20.1349e (Laghouat), 1920.1.20.1349i (Mraier), 1920.1.20.1349g (Biskra), 1920.1.20.3006 (Oued el Kreil).

**Diagnosis**

14 oblique longitudinal rows of ventrals. Relatively shorter hindlegs. Fourth supraocular generally entire. One row of granules between the superciliaries and the supraoculars. Slightly reticulate color pattern in males. Females with pale band on each side of the body.

**Discussion**

In the zones closest to *A. scutellatus*, that is, southern Tunisia and western and southeastern Algeria, *A. d. exiguus* clearly maintains its differences. I was not able to find any intermediate populations between these zones. It appears that *exiguus* fails to make contact with the nearest populations of *aureus* in



Figs. 83—85. *A. dumerili exigus*. Hadjira, Algeria. BM 1920.1.20.1344(416).

southeastern Morocco and, instead, occupies the eastern Hauts Plateaux in northern Algeria extending eastward to western Tunisia. This subspecies seems restricted to the western part of the Algerian central Sahara for in In Salah we find *A. scutellatus*. Intermediate populations between *dumerili* and *exiguus* are found in Río de Oro and in northern Mauritania.

### Specimens examined

#### Algeria

- Bou Saada ( $35^{\circ}12'N$ ,  $4^{\circ}11'E$ ), BM 81.1.8.9.21—2, 1920.1.20.1349b.  
 Bled Ahmar ( $34^{\circ}42'N$ ,  $6^{\circ}44'E$ ), BM 81.1.8.27, 1920.1.20.1349c.  
 Laghouat ( $33^{\circ}48'N$ ,  $2^{\circ}53'E$ ), BM 81.1.8.23—6, 1920.1.20.1349e.  
 Between Tilremt and Laghouat, BM 1920.1.20.1349d.  
 Tuggurt ( $33^{\circ}06'N$ ,  $6^{\circ}04'E$ ), BM 81.1.8.28, 1920.1.20.1349h, 91.5.4.92—3.  
 Mraier ( $33^{\circ}57'N$ ,  $5^{\circ}56'E$ ), BM 1920.1.20.1349i.  
 Wed Nça to El Alia, BM 1912.11.9.67—70.  
 Guerrara ( $32^{\circ}48'N$ ,  $4^{\circ}30'E$ ), BM 1912.11.9.7.  
 Hadjira ( $34^{\circ}38'N$ ,  $7^{\circ}52'E$ ), BM 81.1.8.16—9, 1920.1.20.1349.  
 Wargla ( $31^{\circ}57'N$ ,  $5^{\circ}20'E$ ), BM 81.1.8.20, 1920.1.20.1349f.  
 Between Wargla and El Golea, BM 1912.11.9.78—81.  
 Between El Golea and Fort Miribel, BM 1912.11.9.72—6.  
 Biskra ( $34^{\circ}51'N$ ,  $5^{\circ}44'E$ ), BM 1920.1.20.1349g.  
 El Wed Souf ( $28^{\circ}00'N$ ,  $2^{\circ}16'E$ ), BM 1920.1.20.3856.  
 Ain Sefra ( $32^{\circ}45'N$ ,  $0^{\circ}35'W$ ), BM 1913.7.3.68—77, 1920.1.20.3866.  
 Bordj Moktar ( $36^{\circ}26'N$ ,  $7^{\circ}33'E$ ), BM 1971.728—30.

#### Morocco

- Outskirts of Taouz ( $30^{\circ}15'N$ ,  $7^{\circ}52'W$ ), MNHN P 1970.1037—9.

### *Acanthodactylus longipes* Boulenger

*Acanthodactylus scutellatus* var. *longipes* Boulenger, 1918a: 154. Type locality: "Sahara Algérien". Syntypes, BM 1946.8.30—2 (Wargla), BM 1946.9.3.75 (Wed Nça to El Alia), BM 1946.9.3.74 (El Wed, E of Tuggurt).

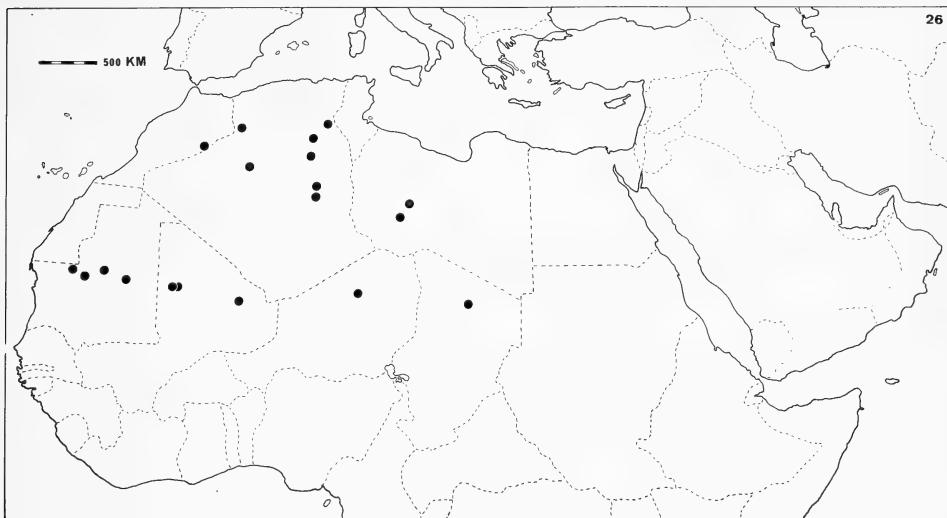
*Acanthodactylus longipes panousei* Bons & Girot, 1964: 327, pl. xii, figs. 5—6, pl. xiii, figs. 1—2. Type locality: "Bord de l'Erg Chebbi au niveau de Merzouga". Syntypes, MNHN P 1963.1013—4.

### Diagnosis

Medium-sized species with relatively long hindlegs. Strongly pectinate eyelids. Small dorsals in high number. 16 oblique longitudinal rows of ventrals. Intense pectination of toes. Lightly reticulate pattern on sides of body, absent on back.

### Distribution

This species is found in southeastern Morocco, the Algerian Sahara, western Mauritania, Fezzan in Libya, Mali, Chad, and Niger.



Map 26. Distribution of *A. longipes*.

## Discussion

Boulenger (1918) described this form as a variety of *A. scutellatus*. Later, but without realizing it, Vinciguerra (1928, 1931) and Scortecci (1946) both spoke of this species in Fezzan, Libya. Scortecci mentioned two forms of *A. scutellatus*, one which had small dorsals, a pale coloring, and inhabited the sand dunes, and another which had large dorsals, reticulate pattern, and inhabited the rocky areas. We now recognize the first one as *A. longipes* and the second one as *A. scutellatus*.

Bons & Girot (1964) admitted *longipes* as a full species for the first time and went on to describe a subspecies, *panousei*, for it in southeastern Morocco characterized by its small size and low number of femoral pores. An examination of specimens from the entire area of distribution reveals the great amount of individual variation in *longipes*. For this reason, it seems best don't recognize the subspecies *panousei*.

Some *scutellatus* specimens from Egypt are very similar to *longipes*. One from Wadi Garani (29°47'N, 31°19'E) (BM not catalogued) presents minute dorsal scales and 16 oblique longitudinal rows of ventrals. It seems that the differences between these two species are most pronounced when they are found in sympatry.

## Description

*A. longipes* is characterized by a medium-sized, slender body, an elongated snout, and relatively very long hindlegs. The lanceolate concavity between the

frontonasal and the middle of the frontal is conspicuous. There is only a very small suture between the nasals. There are three entire supraoculars while the fourth one is very divided. There may be one, two or three rows of granules between the supraoculars and the superciliaries.

There are two supratemporals which may, at times, be fragmented. Both have a central longitudinal keel. Five supralabials lie anterior to the subocular. The subocular, wedged between the fifth and sixth supralabial, has a well-defined keel bordering the orbit and is separated from the upper lip. The eyelids are strongly pectinate. The temporals are medium-sized and keeled. A small tympanic scale is present. The anterior border of the ear opening is pectinated by 4 or 5 scales. The first three of the five pairs of submaxillaries are in contact in the center.

The gulars, numbering from 28 to 43 in a straight line, are small and granular. A gular fold is distinguishable. The collar is considerably reduced. The dorsals, numbering from 60 to 88 across the midbody, are very small, either flat or weakly keeled, and equal in size to the laterals. The ventrals, very small and square-shaped, are arranged in 16 oblique longitudinal rows. The scales on the upperside of the tail are medium-sized and only slightly keeled. The fingers present four series of scales. The fourth toe is very strongly pectinate.

**Color pattern.** The sides display fine reticulation. The limbs are reticulate and covered with conspicuous white ocelli. The general coloration is sand whitish, yellowish, or reddish.

### Specimens examined

#### Mauritania

- Choum (21°20'N, 13°00'W), MNHNP 1967.553.
- Adajer Méridional (19°30'N, 10°00'W), MNHNP 1967.554.
- 20°27.4'N, 8°48'W, BM 1975.1398.
- 20°44.5'N, 10°30'W, BM 1975.1401.
- Chinguetti (20°27'N, 12°22'W), BM (4) not catalogued.
- Amguili, Assabet and Meddahiya, Adrar, MNHNP 1967.519.
- Ogoulet Meilag, MNHNP 1911.73.

#### Mali

- 20°9'N, 4°49'W, BM 1975.1402.
- 20°10'N, 4°9'W, BM 1975.1399.
- Erg d'Admer (19°32'N, 0°24'W), MNHNP 1936.72—3.

#### Libya

- Sebha (27°02'N, 14°26'E), Fezzan, BM 1954.1.6.42.
- 5 mi. S of Murzuch, Fezzan, BM (1) not catalogued.

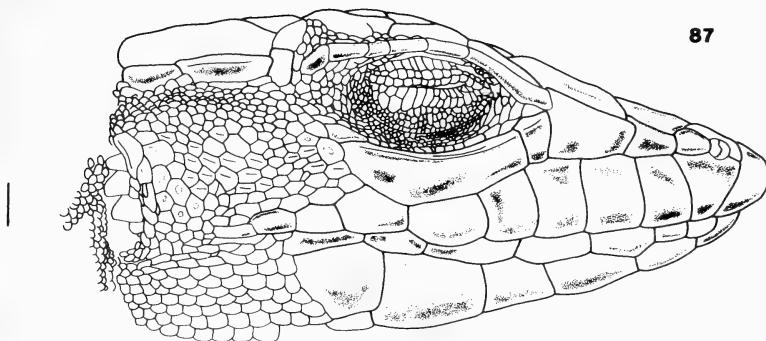
#### Chad

- 19°04'N, 20°36'E, BM (3) not catalogued.

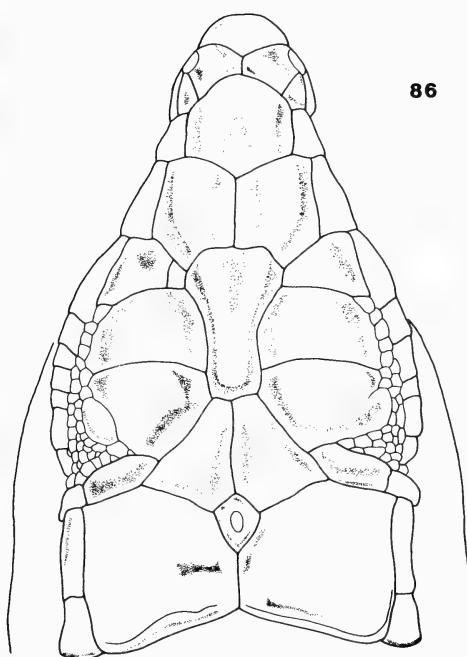
#### Niger

- Limestone Hill (19°37'N, 9°11'E), BM 1977.742.

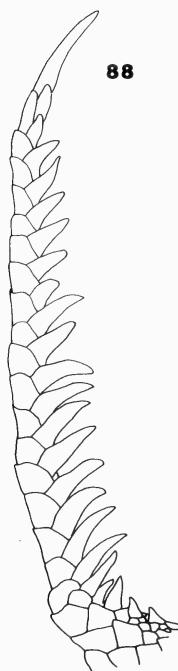
87



86



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Figs. 86—88. *A. longipes*. 20°9' N, 4°49' W, Mali. BM 1975.1402.

**Algeria**

Wargla (31°57'N, 5°20'E), BM 1946.8.4.30—2 (syntype of *longipes*).

El Wed, E of Tuggurt, BM 1946.9.3.74 (syntype of *longipes*).

Wed Nça to El Alia, BM 1946.9.3.75 (syntype of *longipes*).

Ain Sefra (32°45'N, 0°35'W), MCZ 27435.

Kerzaz (29°27'N, 1°25'W), BM 1971.724—6.

100 km. S of Ain Taiba, ZFMK 22787.

25 km. N of Ain Taiba, Hoggar, ZFMK 22804.

30 km. S of Djeribia, ZFMK 22788.

**Morocco**

Erg Chebbi (31°12'N, 3°59'W), Tafilalt, BM 1962.523, MNHNP 1970.1040, ZFMK 26205—6, 26208—9.

**Tunisia**

“Sahara”, ZFMK 22783—6.

### ***Acanthodactylus gongrorhynchatus* Leviton & Anderson**

*Acanthodactylus gongrorhynchatus* Leviton & Anderson, 1967: 171, figs. 9a, 10a. Type locality: “Beda Azan (23°41'N, 53°28'E), Abu Dhabi (Abu Zaby), Trucial Coast”. Holotype, CAS 97803.

#### **Diagnosis**

Slender body with pointed snout swollen at the nasal region. Four supraoculars, the fourth at times divided. One row of granules between the supraoculars and the superciliaries. Four supralabials anterior to the subocular. Subocular not in contact with the lip and lodged between the fourth and fifth supralabial. Three supratemporals. Ear opening almost closed off by two or three scales on the anterior portion.

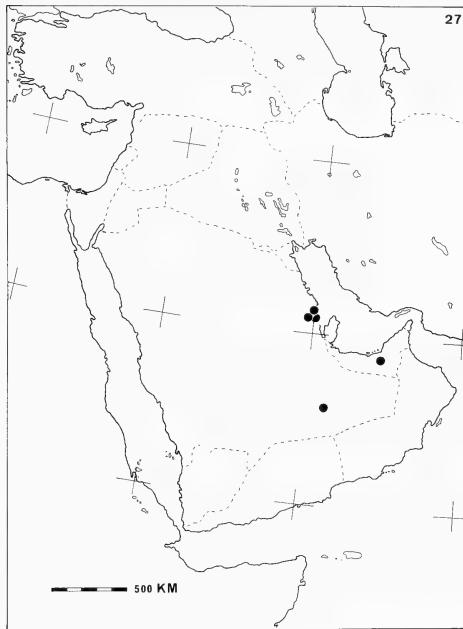
Very small dorsals numbering from 58 to 76 across the midbody. Fingers with four series of scales. Very intense pectination of toes. Scales on the upper-side of the tail medium-sized and only slightly keeled. Ventrals usually arranged in 12 straight longitudinal rows.

#### **Distribution**

This species is only known from the area delimited by the district of El Hasa on the west, Abu Dhabi on the east, and the Rub-al-Khali desert on the south.

#### **Discussion**

*A. gongrorhynchatus* is easily distinguished from the other species of the cantoris group. To a certain degree, it is the morphological equivalent of *A. longipes* from the *scutellatus* group as both are specialists for living in fine sand. *A. gongrorhynchatus* has many traits in common with *A. haasi*, a species only known from Dahran where it exists in sympatry with *A. gongrorhynchatus*.



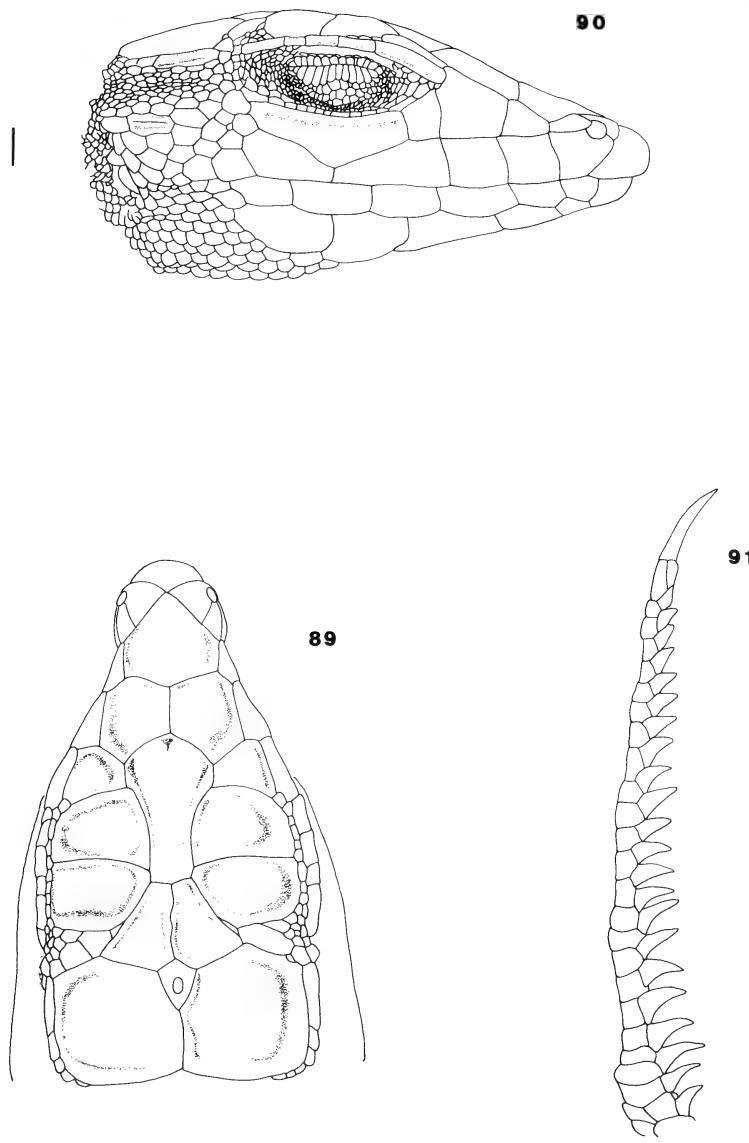
Map 27. Distribution of *A. gongrorhynchatus*.

An examination of the only specimen of *A. haasi* reveals certain differences from *gongrorhynchatus* which make separating them into different species advisable. Nevertheless, until more specimens of *haasi* are available for study, the question of its status cannot be completely resolved.

### Description

This species is characterized by a moderately depressed, slender body. The lanceolate concavity extending from the frontanasal to the middle of the frontal is not very pronounced. The snout is sharply pointed and swollen at the tip. The nasals are raised. There are three large supraoculars while the fourth one is divided into two. There is one row of granules between the supraoculars and the five or six superciliaries.

The anterior loreal is shorter than the second. Four supralabials lie anterior to the subocular. The subocular with a very distinct keel bordering the orbit is separated from the lip and wedged between the fourth and fifth supralabial. There is one keeled supratemporal followed by two or more small ones. The temporals are elongated and somewhat keeled. The ear opening is almost closed off by two or three large scales on the anterior border.



Figs. 89—91. *A. gongrorhynchatus*. 89,90: Bahat Jamal, Saudi Arabia. BM 1931.7.16.50. 91: Rub-Al-Khali desert, Saudi Arabia. BM 1932.10.1.77.

The first three of the five pairs of submaxillaries are in contact down the center. The gulars, numbering from 35 to 44 down the center, are small and become more elongate towards the collar. The dorsals numbering 58 to 76 across the midbody are granular and keeled in the neck region, oval or rhomboidal along the back, and larger, keeled, and subimbricate towards the tail. They are slightly smaller than the laterals.

Although sometimes there may be 10 or 14 rows, the ventrals are usually arranged in 12 straight longitudinal rows. There is a row of 20 to 25 femoral pores on each side of the body. There are four series of scales on the fingers. The toes are intensely pectinate with 24 to 29 unicarinate lamellae under the fourth. The scales on the upperside of the tail are medium-sized and only weakly keeled.

Color pattern. The general coloration is a very pale bleached-sand color. There are seven dark longitudinal stripes which are at times reticulate. Very faint reticulation is present on the limbs. The venter is immaculate white.

### **Specimens examined**

#### **United arab Emirates**

Abu Dhabi, Beda Azan (23°41'N, 53°28'E), CAS 97803 (holotype).

#### **Saudi Arabia**

Abqaiq (25°56'N, 49°40'E), CAS 84339, 84333, 84486 (paratypes), FMNH 73988 (paratype), MCZ 56885.

El Alat (26°28'N, 49°51'E), CAS 84433, 84436 (paratypes).

Dhahran, CAS 84271 (paratype).

Bahar Jamal (20°20'N, 51°42'E), 550', Rub-Al-Khali, BM 1831.7.16.5.

Rub-Al-Khali, BM 1932.10.1.77.

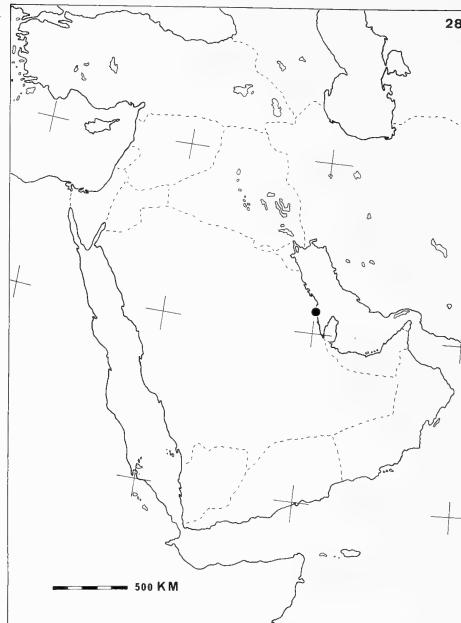
### ***Acanthodactylus haasi* Leviton & Anderson**

*Acanthodactylus haasi* Leviton & Anderson, 1967: 177, figs. 9b, 10b. Type locality: "Dhahr-an (Az Zahran), Saudi Arabia". Holotype, CAS 84596.

### **Diagnosis**

Moderately pointed snout not swollen at the nasal region. Two supraoculars corresponding to the second and the third. First and fourth divided. One or two rows of granules between the supraoculars and the superciliaries. Five supralabials anterior to the subocular. Subocular not in contact with the lip and wedged among the fourth, fifth, and sixth supralabial.

Moderately conspicuous subocular keel. Two supratemporals, the anterior one larger. Granular temporals, the upper ones keeled while the lower ones larger and smooth. Moderately visible ear opening, pectinate anteriorly by two or three scales. Intensely imbricate gulars. Small, weakly keeled dorsals numbering



Map 28. Distribution of *A. haasi*.

44 across the midbody. Ventrals arranged in 12 straight longitudinal rows. Fingers with four series of scales. Strong pectination of the toes with seven keels on each subdigital lamella.

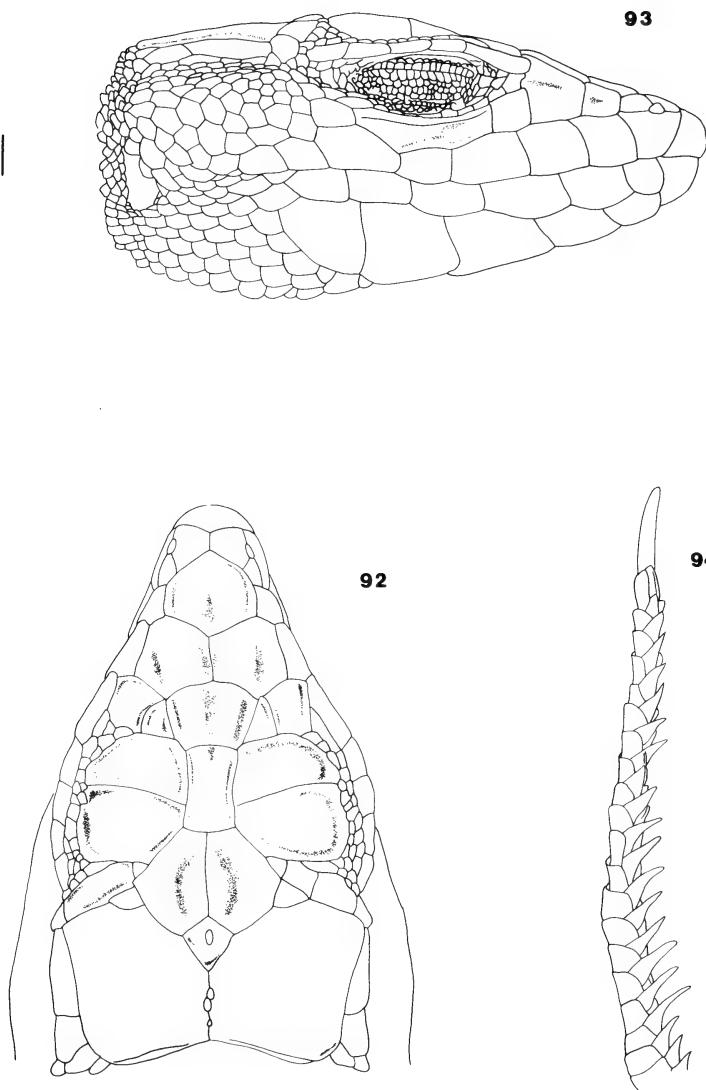
### Distribution

This species is only known from Dhahran in Saudi Arabia.

### Discussion

*A. haasi* is closely related to *A. gongrorhynchatus* although it differs in its not having a swollen snout at the nasal region, its two large smooth supratemporals, its divided first and fourth suproculars, its five supralabials anterior to the subocular, its keeled upper and smooth lower temporals, its intensely imbricate gulars, its 44 dorsal scales at midbody, and its seven keels on each subdigital lamella. This significant number of differences makes it difficult to simply consider it an aberrant specimen.

One might choose to explain it as a case of hybridization perhaps between *A. gongrorhynchatus* and *A. schmidti*. For the moment, however, it seems best to consider it as a separate species.



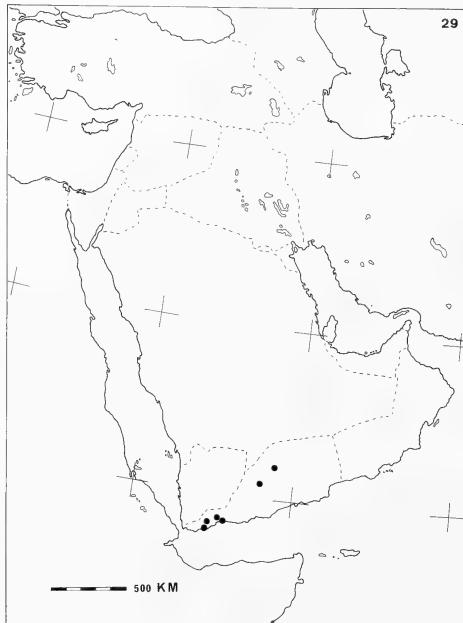
Figs. 92—94. *A. haasi*. Dhahran, Saudi Arabia. CAS 84596.

### Description

*A. haasi* is characterized by a moderately depressed, slender body. The lanceolate concavity extending from the frontanasal to the middle of the frontal is not very pronounced. The snout is moderately pointed and not swollen at the nasal region. There are two supraoculars corresponding to the second and third. The first and fourth are divided.

Either one or two rows of granules may be found between the supraoculars and the five superciliaries. There are five supralabials lying anterior to the subocular, which in turn does not make contact with the lip and is lodged among the 4th, 5th, and 6th supralabials. The subocular keel is only moderately conspicuous. The first of the two supratemporals is larger and smooth. The temporals are granular with the upper ones keeled and the lower ones larger and smooth.

The ear opening is not closed off and has two or three scales on its anterior border. The first three of the five pairs of submaxillaries make contact along the center. The gulars, numbering 23 down the center, are intensely imbricate. The rounded collar is formed by seven scales. The dorsals, numbering 44 at



Map 29. Distribution of *A. arabicus*.

midbody, are small, keeled, rhomboidal, subimbricate, and slightly larger than the laterals. The ventrals are arranged in 12 straight longitudinal rows. There is a row of 19 to 20 femoral pores on each side of the body. Fingers present four rows of scales with seven keels on each subdigital lamella. The toes are strongly pectinate with 26 or 27 lamellae each with 7 keels on the underside of the fourth one. The scales on the upperside of the tail are medium-sized and only weakly keeled.

Color pattern. There is one dark stripe on each side of the back which join together on the tail. Each one displays diffused reticulation. On each side of the body, there is a thick reticulate band.

### **Specimens examined**

Saudi Arabia

Dhahran (17°40'N, 43°30'E), CAS 84596 (holotype).

### ***Acanthodactylus arabicus* Boulenger**

*Acanthodactylus cantoris* var. *arabicus* Boulenger, 1918a: 154. Type locality: "Sud de l'Arabie". Syntypes, BM 1946.8.4.33—42 (Aden), MCZ 28685 (Aden), BM 1946.8.4.93—4 (Lahej), BM 99.12.13.58 (Hills N of Lahej), BM 1946.9.3.56 (Wadis below Mt. Manif, N of Lahej), BM 99.12.13.59 (Abian Hills), BM 1046.9.3.57 (Jimil valley, near Aden), BM 1946.9.8.35—42 (Hadramaut).

### **Diagnosis**

Small, slender body with pointed snout. Four large supraoculars. One row of granules between the supraoculars and the superciliaries. Five supralabials anterior to the subocular. Subocular separated from the lip and lodged among the 4th, 5th, and 6th supralabial. Two supratemporals. Strongly keeled temporals. Scant pectination of ear opening. Intensely imbricate gulars.

Dorsals strongly keeled and double the size of laterals, numbering 27 to 37 across the middle of the body. Ventrals arranged in 14 longitudinal rows with the outermost ones oblique and keeled. Four series of scales on the fingers. Strongly pectinate toes. Color pattern consisting of light and dark longitudinal bands.

### **Distribution**

*A. arabicus* is endemic to South Yemen.

### **Discussion**

A member of the *cantoris* group, *A. arabicus* remains isolated from the other species of the group. No intermediate populations have been found with

*schmidti* in the north nor with *blanfordi* in the east. The notable differences between *arabicus* and *schmidti* are most likely due to a relatively long period of isolation imposed by the Yemen mountains.

### Description

This species is characterized by a small, slender body, a pointed snout, and relatively long hindlegs. The lanceolate concavity running from the frontonasal to the middle of the frontal is well-defined. The snout is not swollen at the tip and the nasals slightly protrude out to the side. There are four large supraoculars with the fourth one, at times, divided into two. One row of granules separates the supraoculars and the five or six superciliaries.

The supraocular region is sharply raised. There are five supralabials lying anterior to the subocular, which in turn is wedged among the 4th, 5th, and 6th supralabial and presents a very distinct keel. The anterior supratemporal is larger than the posterior one. Both have a very conspicuous keel. The temporals are sharply keeled. The ear opening is only scarcely pectinate anteriorly by 4 or 5 scales. The first three of the five pair of submaxillaries meet along the center.

The gulars, numbering 24 to 32 down the center, are intensely imbricate. The scales on the neck, sides, and back are all sharply keeled. The dorsals, numbering from 27 to 37 across the middle of the body, are double the size of the laterals. The ventrals are arranged in 14 longitudinal rows. The four innermost rows are straight while the remaining ones are oblique and moderately keeled. There are 19 to 24 femoral pores on each side of the body running in one continuous row. There are four rows of scales on the fingers. The toes are strongly pectinate with 20 to 24 unicarinate lamellae on the underside of the fourth one. The scales on the upperside of the tail are large and sharply keeled.

**Color pattern.** In adults, traces of three dorsal lines of dark dots are visible. The young display four black stripes on the posterior portion of the back in addition to one on the neck and two on each side of the body. The limbs are clearly reticulate.

### Specimens examined

#### South Yemen

Wadis below Mt. Manif, N of Lahej, BM 1946.9.356 (syntype).

Aden, BM 1946.8.4.33—42, MCZ 28685 (syntypes), BM 1945.12.12.3—5.

Hadramaut, BM 1946.9.8.35—42 (syntypes).

Lahej, BM 1946.8.4.93—4 (syntypes).

Jimil Valley, near Aden, BM 1946.9.3.57 (syntype).

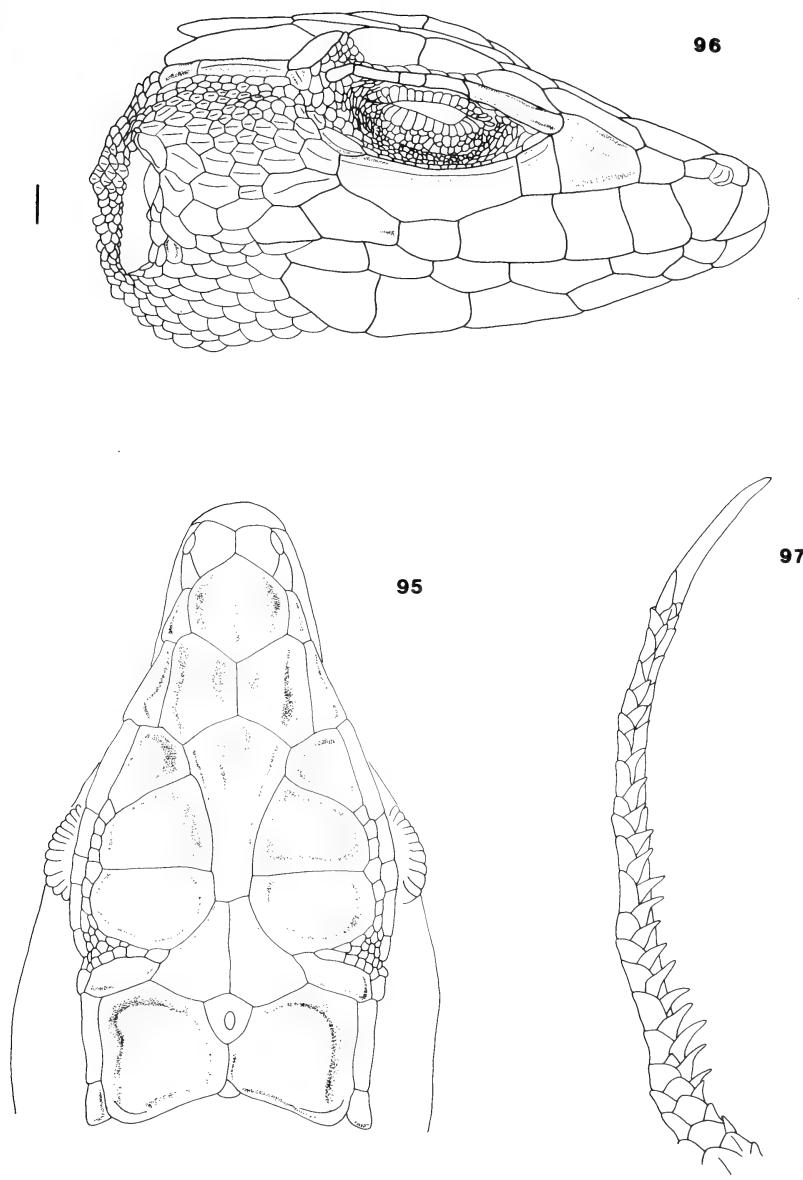
Abian Hill Country, E of Aden, BM 99.12.13.59 (syntype).

Bir Fukom, BM 1945.12.18.1.

Shugra, NHMW 11810.2—3.

Bal-Haf-Azzan, NHMW 11800(5).

Wadi Irma, near Shabwa, FMNH 18455.



Figs. 95—97. *A. arabicus*. Hills N of Lahej, Aden. BM 99.12.13.58.

### ***Acanthodactylus schmidti* Haas**

*Acanthodactylus cantoris schmidti* Haas, 1957: 72. Type locality: "Dhahran, Saudi Arabia". Holotype, CAS 84599.

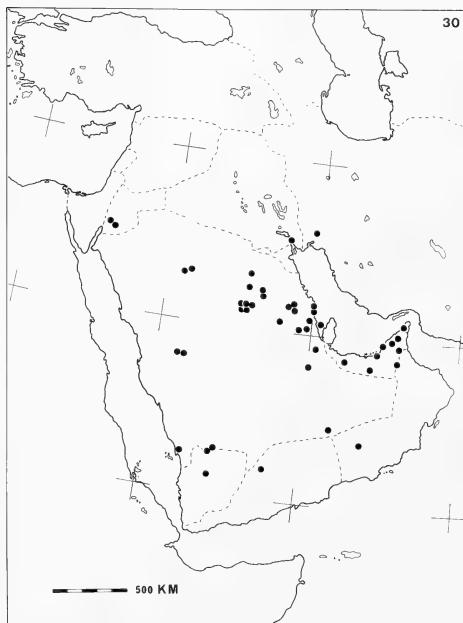
#### **Diagnosis**

Species of variable size. Pointed snout. First, second, and third supraoculars large; fourth usually divided into two. Five supralabials anterior to the subocular. Subocular not in contact with the upper lip and wedged among 4th, 5th, and 6th supralabial. Two keeled supratemporals. Temporals sharply keeled. Ear opening with distinct anterior pectination. Scales on the sides of the posterior dorsum double the size of those in the center of the dorsum and those on the sides of the body.

32 to 54 dorsals across the midbody. Ventrals arranged in 14 or 16 oblique longitudinal rows with the outer rows consisting of pointed scales. Fingers present four series of scales while toes are strongly pectinate. Reticulate color pattern in both young and adults.

#### **Distribution**

This species is found in Saudi Arabia, Oman, United Arab Emirates, South Yemen, Yemen, Bahrein, Jordan, Iraq, and Iran.



Map 30. Distribution of *A. schmidti*.

## Discussion

*A. schmidti* is clearly distinguished from the other species of the *cantoris* group by the peculiar size of the scales on the sides of the posterior dorsum, these being larger than those in the middle of the dorsum. In southern Arabia *schmidti* apparently does not exist in sympatry with any other species nor do we find intermediate populations with *arabicus* in Yemen nor with *blanfordi* in Muscat. In Iran there is an enormous and as yet uninvestigated area separating *schmidti* from *blanfordi* making it impossible, at this time, to know the relationship between these two species in this zone.

The populations of *schmidti* vary considerably throughout its entire area. Let's take the body size for example. The populations of eastern Arabia are relatively small. In the Bahrein series the snout—vent length varies from 47 to 62 mm. and for the specimens from Khuzistan it is somewhat larger ranging from 36 to 85 mm. The populations from Rub-Al-Khali, eastern Arabia, and Jordan, however, are much larger. In the Rub-Al-Khali desert specimens of up to 80 mm. can be found, surpassed by one male specimen from Hafar which measured 105 mm.

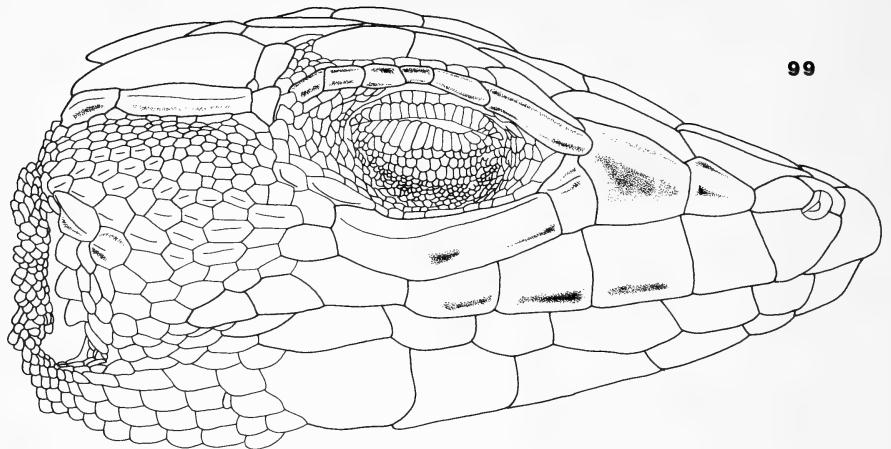
Specimens from Nafud are also quite large with one male found at 27°N, 46°E having a snout—vent length of 103 mm. The two male specimens from Wadi Rum in Jordan have 83 and 90 mm. respectively. The specimens from Fuweila are also very large.

## Description

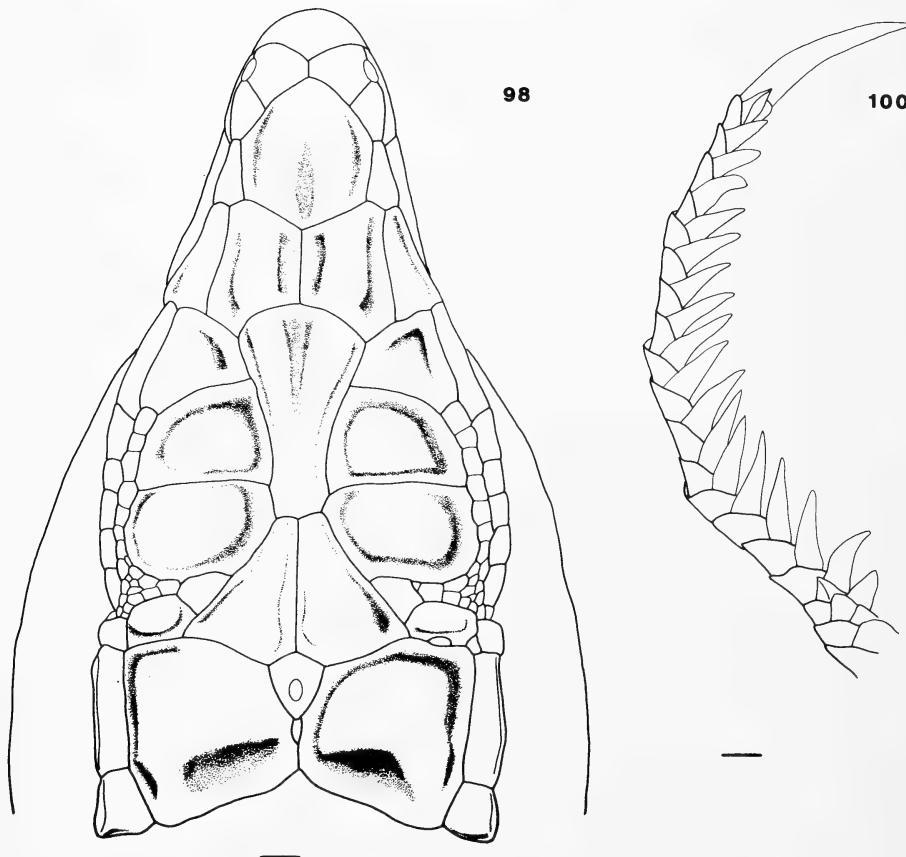
This species varies considerably in size. Its snout is pointed and it has relatively long hindlegs. The lanceolate concavity extending from the frontonasal to the middle of the frontal is well-defined. The nasals protrude out to the side. The first three supraoculars are large while the fourth one is generally divided into two. One row of granules separates the supraoculars from the five to eight superciliaries.

The supraocular region is raised. Five, or sometimes six, supralabials lie anterior to the subocular. The subocular is separated from the lip, lodged among the 4th, 5th, and 6th supralabial, and has a distinct keel. The anterior supratemporal is larger than the posterior one. Both present a very prominent longitudinal keel. The temporals are sharply keeled. The ear opening is distinctly pectinate anteriorly by three to five scales.

The first three of the five pairs of submaxillaries make contact along the center. The gulars are imbricate. The scales on the back, neck, and side of the body are all intensely imbricate. The scales on the sides of the posterior dorsum are double the size of those in the middle of the dorsum and those on the sides of the body. The dorsals number 32 to 54 across the middle of the body. The ventrals are arranged in 14 to 16 oblique longitudinal rows. The outside rows

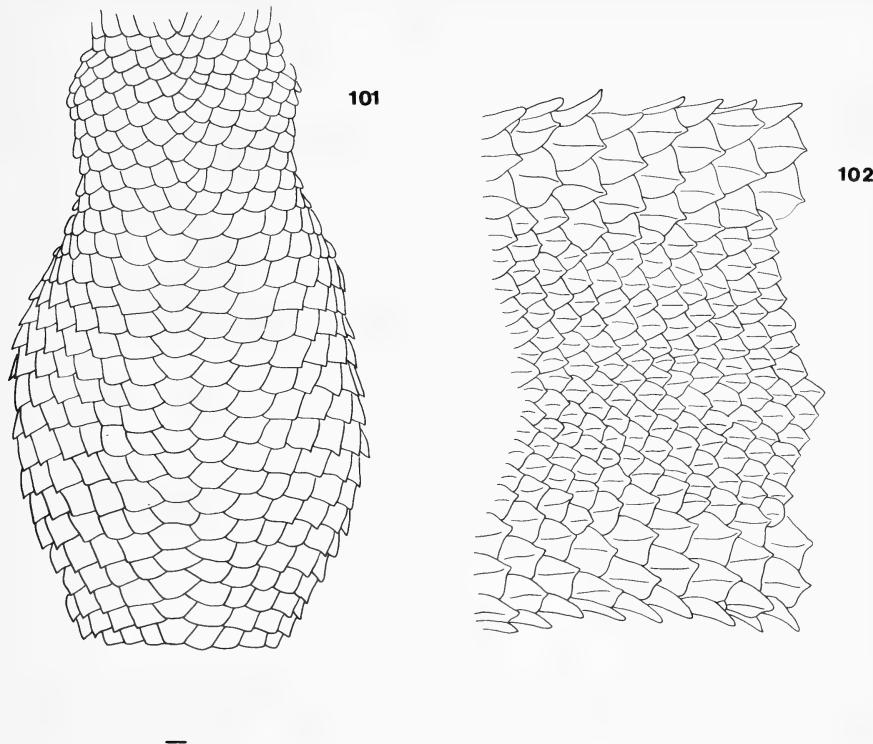


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100



Figs. 98—102. *A. schmidti*. 98—100: Hasa, Saudi Arabia. BM 1953.1.8.55. 101,102: 1 km. E of Ras Noma, Bahrein. BM 1971.1277.

are made up of pointed and lightly keeled scales. There are 17 to 23 femoral pores on each side running in one continuous row across the body or intersected at the center point by one scale.

There are four rows of scales on the fingers. The toes are strongly pectinate with 21 to 25 unicarinate lamellae on the underside of the fourth one. The scales on the upperside of the tail are large and sharply keeled.

**Color pattern.** The color pattern is reticulate in both adults and young.

#### Specimens examined

##### Saudi Arabia

Dhahran, CAS 84599 (holotype), CAS 84268, 84270, 84530, 84598, 84600—1, 84603—6, 84608—9 (paratypes), MCZ 56886 (paratype), FMNH 74010—1 (paratypes), CAS 84597. Qatif (26°33'N, 50°00'E), CAS 84419 (paratype).

- Abqaiq ( $25^{\circ}56'N$ ,  $49^{\circ}40'E$ ), CAS 84332, 84336—7, 84340, 84342 (paratypes), CAS 84497.  
 Shimal ( $25^{\circ}49'N$ ,  $56^{\circ}00'E$ ), CAS 84423 (paratype).  
 Near Ras Tamura ( $26^{\circ}40'N$ ,  $50^{\circ}13'E$ ), AMNH 66606.  
 Outskirts of Matri and Khasawiyah ( $16^{\circ}58'N$ ,  $42^{\circ}42'E$ — $16^{\circ}56'N$ ,  $42^{\circ}37'E$ ), CAS 96206—9,  
 134172—6.  
 Badiyah ( $25^{\circ}26'N$ ,  $56^{\circ}21'E$ ), CAS 102391.  
 Unayzah-Buraydah-Ar Rass area, Nafud Al Ghamis ( $26^{\circ}11'N$ ,  $43^{\circ}54'E$ ), CAS 97576.  
 Unayzah-Buraydah-Ar Rass area, Nafud Al Ghamis ( $26^{\circ}12'N$ ,  $43^{\circ}52'E$ ), CAS 97577.  
 Unayzah-Buraydah-Ar Rass area ( $26^{\circ}11'N$ ,  $43^{\circ}57'E$ ), CAS 97579.  
 Unayzah-Buraydah-Ar Rass area: Al Badayah ( $25^{\circ}55'N$ ,  $43^{\circ}36'E$ ), CAS 97600.  
 Al Caisimah-Turaif, along the Trans Arabian Pipeline, MCZ 56643.  
 Area S of Abqaiq, CAS 139707.  
 Anaiza ( $26^{\circ}06'N$ ,  $43^{\circ}56'E$ ), 2300', FMNH 31652.  
 Near Khobash ( $17^{\circ}32'30''N$ ,  $44^{\circ}48'E$ ), CAS 119234.  
 26 km. S, 25 km. W of Jebel Al Bara ( $23^{\circ}07'N$ ,  $42^{\circ}31'E$ ), CAS 113714.  
 80 km. N, 75 km. E of Jebel Al Bara ( $23^{\circ}35'N$ ,  $43^{\circ}23'E$ ), CAS 113718.  
 Nafud Ash Shugayyigah ( $26^{\circ}01'N$ ,  $43^{\circ}51'E$ ), CAS 102394.  
 8 km. W of Unaizah ( $26^{\circ}05'N$ ,  $43^{\circ}53'E$ ), CAS 102393.  
 Al Hasa, SE of Jafura desert, CM 33519.  
 E of Dahana, near Rumah ( $25^{\circ}34'N$ ,  $47^{\circ}09'E$ ), CM 33528—30.  
 Qatif oasis, CM 33533.  
 Hasa ( $26^{\circ}35'N$ ,  $48^{\circ}10'E$ ), BM 1953.1.8.55.  
 Hofuf ( $25^{\circ}22'N$ ,  $49^{\circ}34'E$ ), BM 1976.1756.  
 $27^{\circ}12'N$ ,  $43^{\circ}55'E$ , BM 1976.342.  
 Jaub Al Izbi, 180', Rub-Al-Khali ( $24^{\circ}N$ ,  $51^{\circ}10'E$ ), BM 1931.7.16.49.  
 Al Udayliyah ( $25^{\circ}05'N$ ,  $49^{\circ}18'E$ ), BM 1969.753.  
 $27^{\circ}35'N$ ,  $44^{\circ}55'E$ , BM 1964.131.  
 Lower Wadi, Najran ( $17^{\circ}33'N$ ,  $45^{\circ}00'E$ ), BM 1963.787.  
 $26^{\circ}18'N$ ,  $47^{\circ}56'E$ , BM 1970.344.  
 Khafs ( $23^{\circ}10'N$ ,  $56^{\circ}41'E$ ), 1800', BM 1935.10.8.15.  
 Rub-Al-Khali desert, BM 1932.10.1.72—6, 1932.10.1.65—70.  
 Yabrin ( $23^{\circ}17'N$ ,  $48^{\circ}58'E$ ), BM 1929.11.18.9.  
 $27^{\circ}00'N$ ,  $45^{\circ}40'E$ , BM 1975.1237—40.  
 6 km. SE of Dabtiyah ( $26^{\circ}26'N$ ,  $48^{\circ}36'E$ ), BM 1971.1347.  
 Hafar ( $27^{\circ}40'N$ ,  $41^{\circ}16'E$ ), BM 1963.785—6.  
 $27^{\circ}N$ ,  $46^{\circ}E$ , BM 1964.130.  
 Nefud ( $27^{\circ}33'N$ ,  $41^{\circ}42'E$ ), near Hail, BM 1963.783—4.  
 Plain between Jarim and Kobeltud, FMNH 18454.  
 Bil Ashush ( $19^{\circ}N$ ,  $51^{\circ}40'E$ ), 850', Rub Al Khali, BM 1931.7.16.48.
- Oman**  
 Oman, BM 1950.14.74.  
 Bai to Salalah, BM 1975.1028—9.  
 Haylat Ash Shisur ( $18^{\circ}16'N$ ,  $53^{\circ}42'E$ ), 1080', BM 1930.6.30.13.
- United Arab Emirates**  
 Bada Zaid Camp ( $23^{\circ}39'N$ ,  $52^{\circ}29'E$ ), Abu Dhabi, BM 1972.837—8.  
 Dunes 3 km. E of Sharjah Camp, Sharjah, BM 1973.2042—8.  
 Between Dhaid and Jebel Faiyah, Sharjah, BM 1972.1163.  
 Sharjah ( $25^{\circ}22'N$ ,  $53^{\circ}23'E$ ), BM 1950.1.6.8, 1972.682—3, 1970.1562—5, 1973.727—30,  
 1972.1358—60.  
 S of Jazirat al Hamra, BM 1973.2049—50.  
 Between Al Hamra and Bada Haza, Abu Dhabi, BM 1972.839.  
 5 km E of Sharjah, on the Dayd road, BM 1971.1283—5.

Mile 46, Abu Dhabi-Bureimi, BM 1950.1.5.8—10.  
 Near Jebel Fayah Camp ( $25^{\circ}06'N$ ,  $55^{\circ}50'E$ ), BM 1971.1253—76.  
 Abu Dhabi, in a 15 mi. radius, CAS 97801—2.  
 Al Liwa area, Abu Dhabi, BM 1971.540.  
 Ajman, BM 1973.404.  
 Ras Ghanada ( $24^{\circ}50'N$ ,  $54^{\circ}45'E$ ), Abu Dhabi, BM 1973.2051.

#### South Yemen

Zamakh ( $16^{\circ}27'N$ ,  $47^{\circ}36'E$ ), N of Jol, BM 1953.1.7.26.

#### Yemen

Daiban Wadi Baihan ( $16^{\circ}00'N$ ,  $44^{\circ}17'E$ ), FMNH 18457—8.

#### Bahrein

Near Ras Noma, BM 1971.98.  
 1 km. E of Ras Noma, BM 1971.1277—82.

#### Jordan

Wadi Rum ( $29^{\circ}41'N$ ,  $35^{\circ}27'E$ ), BM 1976.1374—5, 1976.1303.  
 Fuweila ( $30^{\circ}01'N$ ,  $35^{\circ}29'E$ ), MCZ 9696—8.

#### Iraq

Basrah, ZFMK 19411.

#### Iran

Dunes on the road between Ahwaz and Haft Kel ( $31^{\circ}16'N$ ,  $49^{\circ}11'E$ ), Khuzistan prov., CAS 86488—91, 86515—20, 86541—55.  
 1 km. E of Kupal, on the dunes along the Ahwaz-Behbehan road (ca.  $31^{\circ}16'N$ ,  $49^{\circ}10'E$ ), CAS 141125—9.

### *Acanthodactylus blanfordi* Boulenger

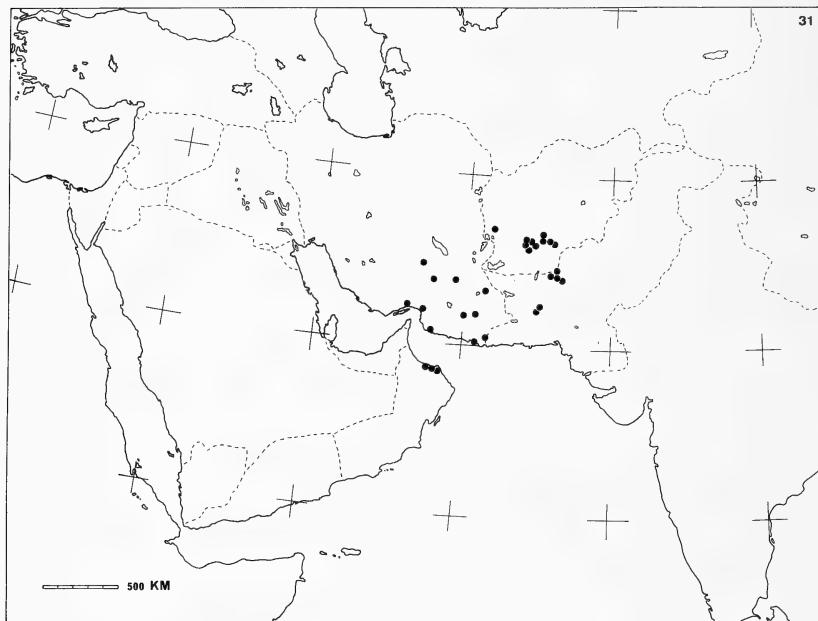
*Acanthodactylus cantoris* var. *blanfordi* Boulenger, 1918a: 154. Type locality: “Perse et Béloutchistan”. Syntypes, BM 1946.9.3.54—5 (Dash), BM 1946.9.8.34 (Mand), BM 1946.9.8.33 (Bam), BM 1946.9.8.43—4 (Jask).

#### Diagnosis

Four supraoculars. One row of granules between the supraoculars and the superciliaries. Five supralabials anterior to the subocular. Subocular separated from the lip. Temporals sharply keeled. Ear opening with only scant anterior pectination. Dorsals small and intensely imbricate. 12 or 14 oblique longitudinal rows of ventrals. Fingers with four series of scales. Toes strongly pectinate. Scales on the upperside of the tail large and sharply keeled.

#### Distribution

*A. blanfordi* occurs in southeastern Iran, western Pakistan, and southern Afghanistan and along the northern coast of the sultanate of Oman. Information about this species’ distribution in Iran was provided by Anderson (1963). For Afghanistan, both Clark et al. (1969) and Anderson & Leviton (1969) have pointed out that the populations differ there. I have verified that the popula-



Map 31. Distribution of *A. blanfordi*.

tions from southern Afghanistan are attributable to *blanfordi* whereas those from the northeast belong to *cantoris*.

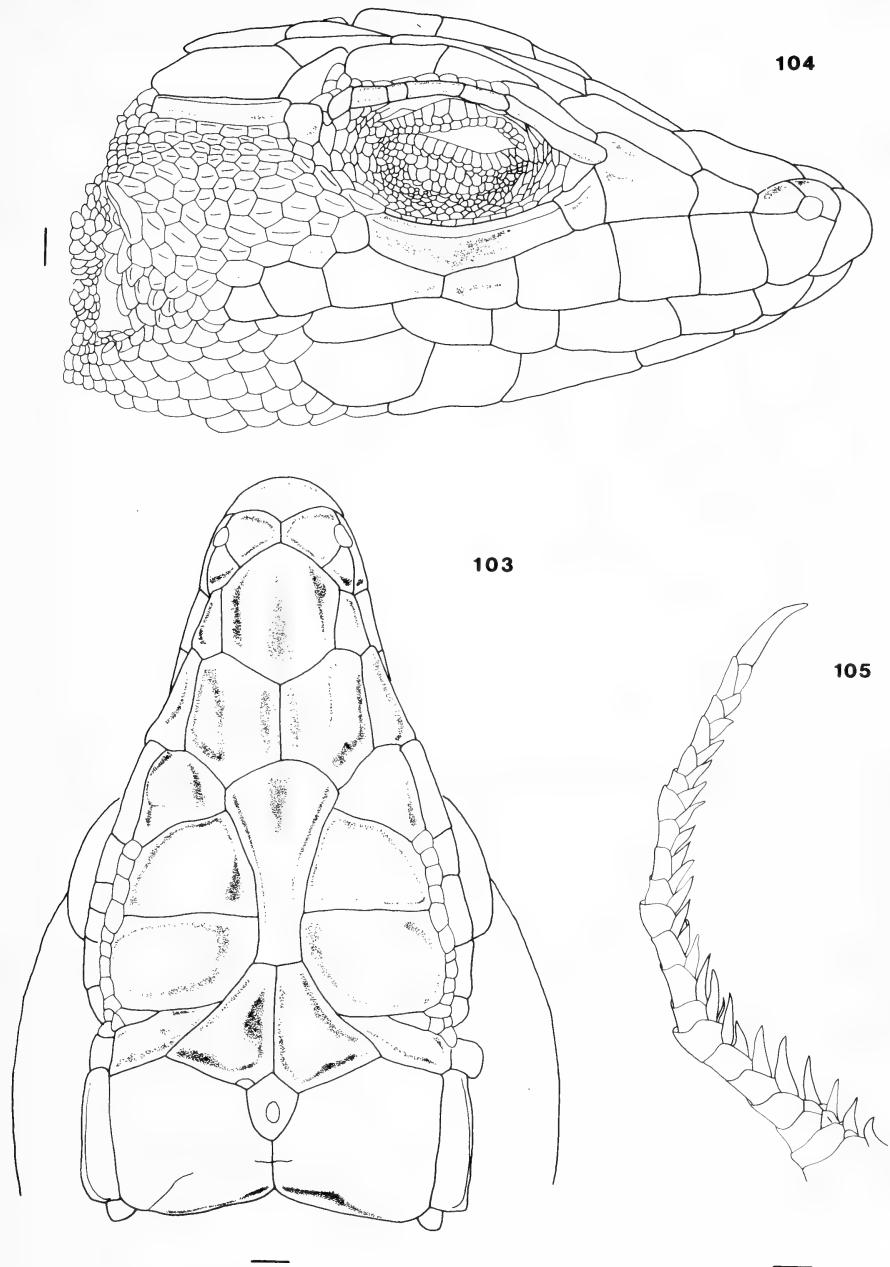
According to Minton (1966) both these forms are present in southwestern Pakistan in Bela and western Kalat; however, after studying his collections, I have come to the conclusion that only *cantoris* is present in Las Bela.

## Discussion

*A. blanfordi* is closely related to *cantoris* displaying a remarkable superficial likeness. The small dorsal scales of *blanfordi*, however, distinguish it from *cantoris*. In my opinion, the recent material collected along the northern coast of Oman should be assigned to *blanfordi*. These specimens are characterized by their small size, 26 to 31 gulars, 8 to 10 scales on the collar, 28 to 36 dorsals, 12 longitudinal rows of ventrals, 17 to 22 femoral pores, and 22 to 24 lamellae on the underside of the fourth toe.

## Description

The species is characterized by a medium-small body, a pointed snout slightly curling upwards, and protruding nasals. The lanceolate concavity extending from the frontonasal to the middle of the frontal is conspicuous. The snout is



Figs. 103—105. *A. blanfordi*. Jask, Iran. BM 1946.9.8.44.

swollen at the nasal region. The hindlegs are neither long nor short. There are four supraoculars. The fourth one is the smallest and is, sometimes, divided. One row of granules separates the supraoculars and the five to seven superciliares.

The supraocular region is sharply raised. There are five supralabials lying anterior to the subocular. The subocular with its distinct keel is separated from the lip and situated among the 4th, 5th, and 6th supralabials. There may be one or two supratemporals with the anterior one always larger and each with a very conspicuous central longitudinal keel. The temporals are sharply keeled. The ear opening presents only scant pectination formed by 3 to 5 scales.

The collar is either angular or rounded and formed by 7 to 11 scales. The first three of the five pairs of submaxillaries are in contact along the center. The gulars are imbricate, but less so towards the middle, and number 28 to 35. The scales on the neck, back, and sides of the body are all sharply keeled. The dorsals, numbering from 37 to 50 across the middle of the body, are flat, slightly pointed, keeled, and larger than the laterals. The scales are gradated in size from the middle of the body side towards the venter. The ventrals are arranged in 12 or 14 longitudinal rows with the outer rows lying obliquely and made up of pointed scales. There are 14 to 22 femoral pores on each side running in one continuous row across the body or intersected at the center point by one scale. There are four rows of scales on the fingers. The toes are strongly pectinate with 20 to 23 unicarinate lamellae on the underside of the fourth one. The scales on the upperside of the tail are large and sharply keeled.

**Color pattern.** In young specimens there are three dark stripes down the middle of the back which join together a little after entering the tail. In the anterior portion of the back, there are two additional stripes. On each side of the body there are three bands of which the middle one is reticulate. In adults the bands have disappeared and the coloration is a uniform lead gray.

### Specimens examined

#### Afghanistan

Chah-I-Angir (31°41'N, 64°19'E), CAS 84676, 84678—9, 84681—3.

31°43'N, 64°45'E or 31°23'N, 65°53'E, CAS 97993.

20 mi. SE of Kandahar (31°23'N, 65°53'E), CAS 97977, 97994.

40 km. SE of Kandahar, CAS 120336—57.

45—55 km. S of Lashkargah (31°35'N, 64°21'E), CAS 120361—3.

20 mi. E of Girishk (31°43'N, 64°45'E), CAS 97970—1.

10—18 km. E of Girishk, CAS 120330—5.

45 km. N of Juwain, CAS 120370.

56 km. S, 10 km. E of Darweshan, CAS 120371.

10 km. N of Darweshan, CAS 120364—6.

35 km. S of Darweshan, CAS 120367.

10 km. NE of Darweshan, CAS 120368—9.

Between Nushki and El Helmand, BM 86.9.21.77—9.

**Iran**

Kirman, MCZ 25925.

11 mi. W of Iranshahr, Baluchistan, FMNH 141454—9, 141461, 141464—5, 141467, 141470, 141473—6, CAS 102523—30.

31 km. W of Bampur, Jaz Murian Depression (ca. 27°10'N, 60°09'E), Baluchistan, CAS 141084.

30 km. W of Bampur (ca. 27°10'N, 60°10'E), Jaz Murian Depression, CAS 141073.

26 km. of Mil-E-Naderi, near Fahraj, on the road between Bam and Zabedan (ca. 28°59'N, 58°57'E), CAS 141106.

Near Khash, Baluchistan, USNM 148673—5.

Chah-Bahar (25°18'N, 60°37'E), Baluchistan, USNM 148656—8.

Dunes on the road between Bandar Abbas and Kerman, Laristan prov., CAS 86588—9.

Dunes N of Minab, Laristan prov., CAS 86592.

Dunes at Shaqu, Laristan prov., CAS 86600—9.

Bam, BM 1946.9.8.33 (syntype).

Jask (25°38'N, 57°46'E), BM 1946.9.8.43—4 (syntype).

**Pakistan**

Dasht, Baluchistan, BM 1946.9.3.54—5 (syntype).

Mand, Baluchistan, BM 1946.9.8.34 (syntype).

Gischri, NHMW 11814.1—16.

18 km. SE of Kharan, Kalat prov., USNM 158552—5.

Nag, 4000', 75 mi. of Panjgur, MCZ 54438—9.

13 km. SW of Panjgur, Makran prov., USNM 159375, 159378—81.

2 mi. NW of Ahmad Wal, Chagai distr., AMNH 88565—6.

1.5 mi. S of Ahmad Wal, AMNH 96189.

9—10 mi. NW of Nushki, Chagai distr., AMNH 88574.

8 mi. NW of Nushki, AMNH 96182—8, UMMZ 127687—8.

25 km. SW of Nushki, USNM 158545—8, 159358—61, 159363—4, 159366.

Ormara, Baluchistan, ZFMK 26278—82.

**Oman**

Hayl Awamir, Batinah (23°39'N, 58°14'E), BM 1976.1462.

Je Batinah (23°35'N, 58°27'E), BM 1976.1463—4.

Near Qurm creek, W of Muscat (23°37'N, 58°28'E), BM 1977.68.

Near Qurm, BM 1977.69.

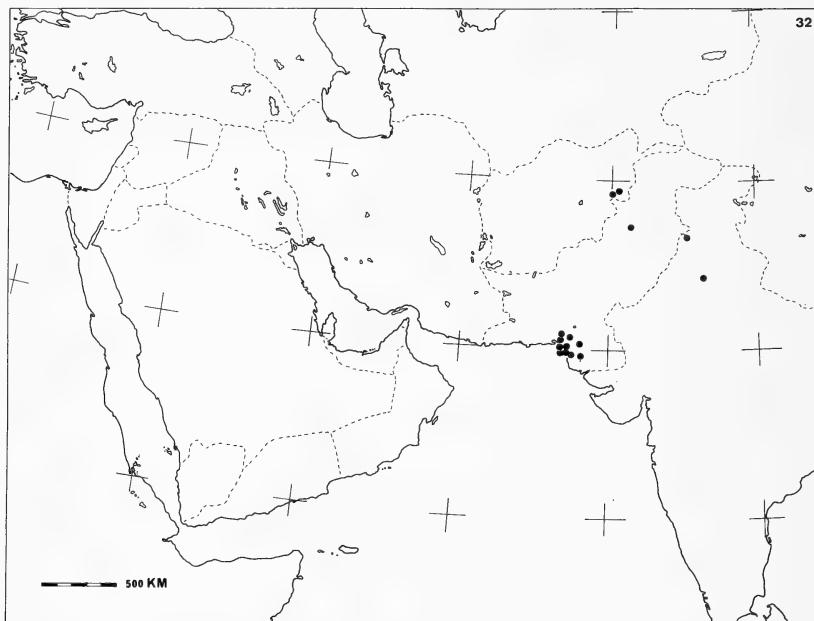
Qurm (23°37'N, 58°29'E), near Muscat, BM 1973.723—6.

### ***Acanthodactylus cantoris* Günther**

*Acanthodactylus cantoris* Günther, 1864b: 73. Type locality: "Ramnagar". Syntypes, BM 1946.8.4.15—20.

#### **Diagnosis**

Large species. Pointed snout. Four supraoculars. One row of granules between the supraoculars and the superciliaries. Five supralabials anterior to the subocular. Subocular not in contact with the upper lip. Temporals keeled. Anterior pectination of ear opening present. Dorsals granular, keeled, and imbricate. Four rows of scales on fingers. Strongly pectinate toes. Scales on the upperside of the tail large and sharply keeled.



Map 32. Distribution of *A. cantoris*.

### Distribution

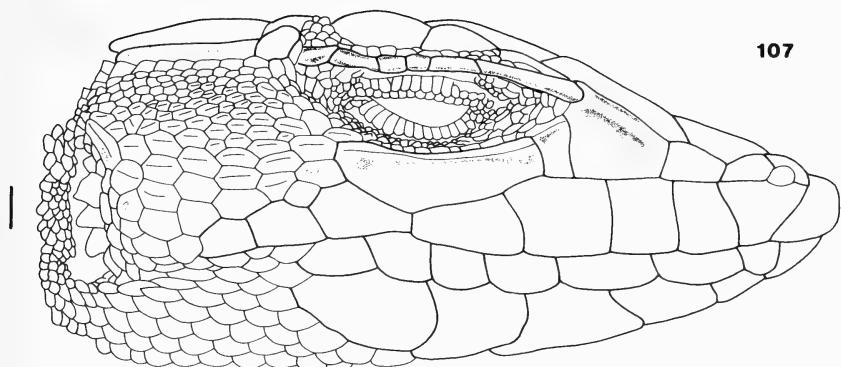
This species is found in eastern Pakistan extending west to the Las Bela district. It's also found in the Thar and Sind deserts reaching as far north as the Punjab in India and the eastern part of Afghanistan. Distributional data are recorded by Krishna & Dave (1956), Parshad (1914), Singh & Singh (1972), Smith (1935) and Stolizca (1872).

### Discussion

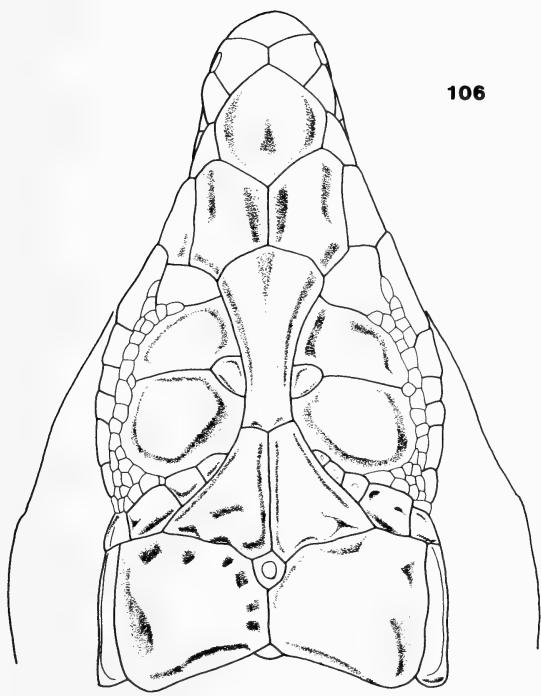
See discussion for *A. blanfordi*.

### Description

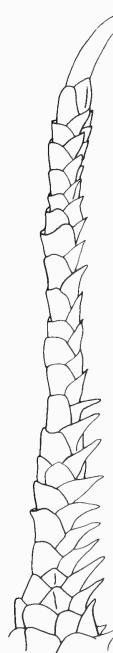
This species is characterized by a large body. The head is elongated with the snout slightly pointed upwards. The nasals are raised and the pointed snout is swollen at the nasal region. The hindlegs are neither long nor short. There are four supraoculars. At times, the fourth one is divided. One row of granules separates the supraoculars and the five to seven superciliaries. The supraocular region is slightly raised. Although at times there may be six, there are usually only five supralabials lying anterior to the subocular.



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106



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Figs. 106—108. *A. cantoris*. Kireeree, Punjab, India. BM 1913.7.22.

The subocular is separated from the lip, wedged among the 4th, 5th, and 6th supralabials and has a distinct keel. There are two supratemporals. The anterior one is larger but both have a very conspicuous longitudinal keel. The temporals are keeled. The ear opening is pectinate anteriorly by three or four scales. The first three of the five pairs of submaxillaries are in contact along the center.

The gulars, numbering 23 to 30 down the center, are moderately imbricate. The scales on the neck, back, and sides of the body are all sharply keeled and imbricate. The dorsals, numbering 30 to 41 across the center of the body are flat, pointed, sharply keeled, and much larger than the laterals. The ventrals are arranged in 12 or 14 longitudinal rows. The outermost ones are lying obliquely and consist of pointed scales. There are 19 to 23 femoral pores on each side running in either one continuous row across the body or in a row intersected at the center point by one scale.

The fingers have four series of scales. The toes are strongly pectinate with 20 to 24 unicarinate lamellae on the underside of the fourth one. The scales on the upperside of the tail are large and sharply keeled.

**Color pattern.** Adults have a somewhat uniform brown-lead-gray coloration with a few black spots on the back. The limbs are without ocelli. Young specimens have seven dark stripes at the center portion of the back but eight at the anterior portion. There are two vertebral stripes which join together at the middle of the body and disappear at the insertion of the tail. On each side there is a parietal band which join together at the beginning of the tail. In addition to these, there are two bands on each side of the body. The limbs are reticulate.

### Specimens examined

#### Pakistan

- Qayumabad, Korangi road, Karachi, BM 1973.447—53.
- River Malir Bridge, national highway, Karachi, BM 1973.454—5.
- 0.5 mi. E of Bela, Las Bela distr., AMNH 84282.
- Hinidan cross, Hab. river, Las Bela distr., AMNH 84283, 88273.
- Shores of Lake Hor, Las Bela distr., AMNH 84284—6.
- W of Miami Hor, Las Bela distr., AMNH 88270—2.
- 70km. N of Karachi, Las Bela distr., USNM 158557—8.
- 12 mi. S of Mianwali, Mianwali distr., AMNH 88473—4.
- Near Pir Patho, Tatta distr., AMNH 89310.
- 3 mi. W of Gharo, Tatta distr., AMNH 81511—2.
- 5 mi. S of Shangar, Shangar distr., AMNH 85573.
- 1 mi. SE of Thano, Dadu distr., AMNH 82215.
- Bajana Nai near the R. R. Unapur Station, Dadu distr., AMNH 84046.
- 23 mi. NE of Malir, in the River Sari canyon, Dadu distr., AMNH 85850—1.
- 2 mi. N of Karachi Airport, AMNH 81513—6.
- Karachi Air Base, FMNH 42224.
- Hawke Bay, Karachi distr., UMMZ 121993(2), 121995(3).
- Karachi, ANSP 27075, 27272—3, USNM 13505—9.
- Near Karachi, USNM 148104—9, 149653, 150609.
- Bihar, Karachi distr., UMMZ 121994.

Nazimabad North, Karachi distr., TCWC 23865—6.  
Gizri (24°48' N, 67°03' E), CAS 99767—71, 99982—3, 99824—33.

#### India

Ramnagar, Agra, BM 1946.8.3.15—20 (syntypes).  
Hissar, BM 70.11.29.15(5).  
Kiruru, Punjab, BM 1913.7.22.1—4.  
S Sind, Thar distr., BM 1917.6.18.1—2.  
Kaur Bridge, Kulachi NWFP, BM 1933.5.16.6—7.  
Campbellpur, NW Punjab, BM 1933.5.16.8.  
Thar and Pakar, BM 1933.5.16.11—12.  
E of Rohri, Sind, BM 1933.5.16.11—12.  
Hissar and Ferozepore, BM 1934.10.9.3—4.

#### Afghanistan

Jalalabad (36°46' N, 65°52' E), FMNH 161164.  
Zusammenfluss Surkh-rod and Kabul River, Jalalabad, ZFMK 20984—5.  
Jalalabad to Nimla, CAS 120358—60.  
5 to 10 mi. NE of Nimla, on the old Kabul—Jalalabad road, approx. 10 mi. SW of Balabagh  
(34°19'—21' N, 70°10'—15' E), CAS 96200—1.

## 10. SUMMARY

The present revision undertakes the genus *Acanthodactylus*, lizards of the family Lacertidae that inhabit the dry and desert zones of north Africa and southwest Asia, with marginal populations in the Iberian peninsula and Cyprus. More than 6,000 specimens of this genus have been examined, belonging to the most important American and European collections. In addition, more than 450 radiographs were examined for the osteological study.

The historical resumé presents, in chronological order, all the papers dealing with the genus *Acanthodactylus*, with special attention to taxonomic studies. Also included is a key which permits the determination of all the species recognized in the genus.

A series of external (size and proportions, pholidosis, pattern, and color) and internal characters (osteological) were studied emphasizing the variability of each. Then a country was chosen, for example Egypt, where an important part of the collections came from. For a specific locality several combinations of character states were found, corresponding to different species. The same operation was performed for the rest of the Egyptian localities and the combinations of character states were found to coincide, permitting identification of the following species: *A. boskianus*, *A. scutellatus*, and *A. pardalis*. By extending the research to the east and west, new taxa were added. Special attention was given to the character states combinations in sympatry and allopatry with the result that in some cases it was possible to affirm that populations of the same species were being dealt with.

The genus *Acanthodactylus* has been divided into several groups of species presenting affinity among them. The first of these is the *micropholis* group with a single species, *A. micropholis*. This is considered to be the most primitive species of the genus. Another one is the *boskianus* group, with the species *A. boskianus* and *A. schreiberi*. The first is discussed extensively analyzing the complex geographical variability that it presents. The *yemenicus* group is found in the Arabian peninsula and is composed of *A. yemenicus* n.sp., *A. masirae*, *A. opheodurus*, and *A. felicis*.

Another is the *tristrami* group with the species *A. tristrami* and *A. robustus*. For the first of these the validity of the subspecies *orientalis* is denied and *iracensis* is admitted for the eastern populations. In the *grandis* group only *A. grandis* is included and *A. fraseri* is considered a synonym of it. The *erythrurus* group comprises the species *A. erythrurus*, *A. savignyi*, *A. blinci*, *A. boueti*, and *A. guineensis*. The last was originally included in the genus *Eremias* but evidence encountered sustains its inclusion in the *erythrurus* group. In the *pardalis* group are contained *A. pardalis*, *A. bedriagai*, *A. maculatus*, *A. spinicauda*, and *A. busacki* n. sp. from Morocco. The *scutellatus* group consists of the following species: *A. scutellatus*, *A. aureus*, *A. dumerili*, and *A. longipes*. The last one is the *cantoris* group with *A. cantoris*, *A. arabicus*, *A. schmidti*, *A. blanfordi*, *A. gongrorhynchatus*, and *A. haasi*.

A bibliography relative to the genus concludes the study. For each species diagnosis, distribution map, synonyms, discussion, scale drawings, description and list of material examined are included.

## 11. ZUSAMMENFASSUNG

Die vorliegende Revision betrifft die Gattung *Acanthodactylus* (Familie Lacertidae), die die Trocken- und Wüstengebiete des nördlichen Afrika und des südwestlichen Asiens bewohnt, mit Randpopulationen auf der Iberischen Halbinsel und auf Zypern. Mehr als 6000 Exemplare der Gattung, aus den bedeutendsten europäischen und amerikanischen Sammlungen, wurden untersucht. Zusätzlich wurden über 450 Röntgenaufnahmen für osteologische Untersuchungen ausgewertet.

Die historische Übersicht behandelt in chronologischer Reihenfolge alle Arbeiten, die sich mit der Gattung *Acanthodactylus* beschäftigen, mit besonderer Berücksichtigung taxonomischer Studien. Ein beigegebener Bestimmungsschlüssel ermöglicht die Determination aller Arten der Gattung.

Eine Reihe äußerer (Größe und Proportionen, Pholidose, Färbung und Zeichnung) und innerer (d.h. osteologischer) Merkmale wurde im Hinblick auf ihre Variabilität untersucht. Dann wurde ein Land ausgesucht, z.B. Ägypten, aus dem eine gute Materialbasis zur Verfügung stand. Für einen bestimmten Fundort in diesem Lande wurden sodann einige Kombinationen von Merkmalszuständen ermittelt, die sich aus dem Auftreten verschiedener Arten ergaben. Derselbe Vorgang wurde sodann auf den Rest Ägyptens übertragen, und die Merkmalskombinationen stellten sich als übereinstimmend heraus; sie erlaubten dadurch eine sichere Zuordnung von Tieren zu folgenden Arten: *A. boskianus*, *A. scutellatus* und *A. pardalis*. Durch die Ausdehnung der Untersuchung nach Westen und Osten kamen weitere Taxa hinzu. Besondere Aufmerksamkeit wurde diesen Merkmalskombinationen im Hinblick auf sympatrisches oder allopatrisches Auftreten der betroffenen Arten gezollt, mit dem Ergebnis, daß es in einigen Fällen möglich war, abzusichern, daß es sich um Populationen derselben Art handelte.

Die Gattung *Acanthodactylus* wurde in mehrere Artengruppen gegliedert, die sich durch engere Beziehungen ihrer Arten untereinander auszeichnen. Die erste ist die *micropholis*-Gruppe mit der einzigen Art *A. micropholis*. Sie wird als die ursprünglichste der gesamten Gattung angesehen. Eine weitere Gruppe ist die *boskianus*-Gruppe, mit den Arten *A. boskianus* und *A. schreiberi*. Erstere wird ausführlich analysiert im Hinblick auf ihre außerordentlich große geographische Variabilität. Die *yemenicus*-Gruppe besiedelt die Arabische Halbinsel und besteht aus *A. yemenicus* sp.n., *A. masirae*, *A. opheodurus* und *A. felicis*. Eine weitere Gruppe ist die *tristrami*-Gruppe mit den Arten *A. tristrami* und *A. robustus*. Für erstere wird die Validität der Unterart *orientalis* verneint, die für *iracensis* dagegen bejaht. In die *grandis*-Gruppe wird hier nur *A. grandis* gestellt, während *A. fraseri* als dessen Synonym aufgefaßt wird. Die *erythrurus*-Gruppe enthält *A. erythrurus*, *A. savignyi*, *A. blinci*, *A. boueti* und *A.*

*guineensis*. Letzterer rangierte bislang in der Gattung *Eremias*, gehört aber nach den hier vorgelegten Befunden in die *erythrurus*-Gruppe von *Acanthodactylus*. In der *pardalis*-Gruppe sind enthalten: *A. pardalis*, *A. bedriagai*, *A. maculatus*, *A. spinicauda* und *A. busacki* sp.n. aus Marokko. Die *scutellatus*-Gruppe besteht aus *A. scutellatus*, *A. aureus*, *A. dumerili* und *A. longipes*. Die letzte Gruppe ist die *cantoris*-Gruppe mit den Arten *A. cantoris*, *A. arabicus*, *A. schmidti*, *A. blanfordi*, *A. gongrorhynchatus* und *A. haasi*.

Eine Bibliographie über die Gattung beschließt die Arbeit. Für jede Art werden Diagnosen, Verbreitungskarten, Synonymien, Beschreibungen und Materiallisten der untersuchten Tiere sowie auch Strichzeichnungen gegeben.

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